



A. L. Peirson.

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CLINICAL LECTURES ON SURGERY,

DELIVERED AT HOTEL DIEU, IN 1832,

BY

BARON DUPUYTREN.

PUBLISHED BY AN ASSOCIATION OF PHYSICIANS.

TRANSLATED FROM THE FRENCH,

BY

A. SIDNEY DOANE, A. M., M. D.

B O S T O N :

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TRANSLATOR'S PREFACE.

WE presume that no apology is needed for again intruding on the profession with another book, especially as it presents the views of one of the most distinguished surgeons of the age, on a variety of interesting topics, many of which have received new light from his labors.

Any one who attends M. Dupuytren's courses, must be astonished at the extreme value of his practical remarks, which cannot but be received with great deference, when we consider that they are the gleanings of twenty-five years of a full practice, to say nothing of his rare opportunities. The wars of Napoleon, the glorious three days of 1830, and the civil commotions which agitated Paris in 1832, are a few of the uncommon facilities for professional improvement which he has enjoyed, and of which he has amply availed himself.

Since our return from Europe, we have often regretted that our notes of his lectures were not sufficiently copious to present to the profession even a brief view of his improvements in surgery, and we gladly availed ourselves of an opportunity to render into English the *Leçons Orales de Clinique Chi-*

rurgicale, satisfied that by so doing we were benefiting the cause of professional science and of humanity.

The prospectus of the French publication states, "that the idea of publishing the clinical lectures of a man who stands first among his contemporaries, has seemed to us a happy one, and its execution a benefit to science, to students, and to practitioners. It seems surprising that during the brilliant career of this illustrious surgeon, no one has attempted to present to the public his varied and instructive lectures. We have undertaken this task, and our expectations have been more than realized. The medical men in the public establishments of France, and in foreign countries, have rewarded our exertions by ample subscriptions."

The original work has been well received, translated into the different continental languages, and extensively quoted in the different medical journals. Three courses of lectures have been published, the first of which is now presented to the American reader. The other courses are translating, and will be published immediately.

October 4th, 1833.

ORIGINAL PREFACE.

IN publishing the Clinical Lectures delivered at Hotel Dieu by Baron Dupuytren, we consider ourselves as conferring a real benefit upon science. This is proved beyond all doubt, if we take into view the material results of this publication, and the number of subscribers we have already obtained. Perhaps, also, we may be allowed to consider this ardor of the medical profession as a flattering acknowledgment of the zeal, if not of the talent, with which we have hitherto fulfilled our task. We, however, must briefly explain to our readers the plan of our work, and the spirit in which it has been pursued.

Some persons imagined, when the prospectus of the "*Clinical Lectures*" appeared, that we should note down M. Dupuytren's remarks day after day, and publish them the following week. We cannot conceive how any one, who has attended a clinical lecture, could have formed such an idea. A clinical course is a daily and successive statement of the cases of patients actually sick, all of whom are affected with different diseases, or of whom two or three, at most, present an affection of the same kind. But the patients mentioned by the professor to-day, and those of whom he will speak to-

morrow, must necessarily be mentioned several days or a month hence, and often several months afterward. The remarks which are elicited by certain diseases on one day, will be repeated with additions, or corroborated by new considerations, because other analogous facts have been observed in the course of the year. The pathological history of an individual would then be given a few lines at a time, in eight or ten different parts, and the professor's opinions relative to the same disease would be found in one hundred different places. The number of patients mentioned by the professor in one lecture is generally eight or ten : each weekly part then would contain a few lines of from forty-eight to sixty different cases. Could a work of this kind, where so much confusion existed, be of any interest or utility ? No. The project would be absurd and impossible, and the reader would possess an inextricable web, from which he could derive instruction only by the most arduous research.

On the other hand, ought we to confine our publication to the details of *cases*, although very complete, with the remarks to which they gave rise ? This mode is proper, and even necessary for some rare cases ; but adopted as the basis of a work, it would be only a new complication ; one new source of ennui to the public.

It follows from our remarks that the publication of a course of clinical surgery is by no means so easy as might be supposed : the plan we follow has rendered our labor still more arduous and complex : but it seemed to us the only one valuable to science—the only one truly useful, and essentially instructive.

Every pathological case, as it is presented to the professor,

gives rise to two classes of practical remarks : the one class is general, and relates to the species : the other is special, and is deduced from the case before him. By adding other cases which he has mentioned, and other remarks which he has given before when treating of analogous cases, we present on each topic of surgical pathology, a summary of the most important doctrines, and even a body of knowledge as complete as possible, in which opinions are supported by a number of cases, principles are established, the varieties of a species are mentioned, the plan of treatment is defended, and the operation described. Thus the acquired experience of the professor is placed at the side of his daily remarks, and one strengthens the other. Thus the facts of each day are compared with facts observed for twenty-five years of assiduous labor, and confirm or modify the consequences he has deduced from them. Finally, in this manner our readers profit at the same time by the clinical lectures of the present and preceding years. Such is the method in which most of the articles composing this volume have been prepared.

But this plan does not prevent us from returning to a subject treated of in a general article, if the professor, from the interest excited in it, again recurs to it. The lectures on *Permanent retraction of the fingers*, and the different causes of it, are instances of this. This plan, also, does not prevent us from presenting all the details of a single case, which is interesting from its complications, from the difficulties of its diagnosis, from the obstacles to, or the chances of, the operation : the article on the remarkable case of hydrosarcocele is a proof of this.

The volume which we now present to the public contains

nineteen articles, some of which are entirely new, and others are treated much more perfectly than they ever have been before. *Permanent retraction of the fingers, from the cramping of the palmar aponeurosis*, was a subject hitherto unknown; it belongs entirely to M. Dupuytren, who has given on it a lecture full of interest, and which has been republished in many of the journals. The same remark applies to *Engorgement of the testicles*, which has elicited practical remarks of the highest importance. The lecture on *Burns* is one of those treated with the most talent; and M. Dupuytren's doctrines on this affection are now generally adopted. Finally, what subject can give a better idea of his advancement of modern surgery, than his doctrines and modes of treatment of *Fractures of the lower extremity of the fibula, and dislocations of the foot?*

Some critics have attempted to bring our book into disrepute by dissecting some of our phrases, and pointing out a few typographical errors. These, however, were inevitable, from the hasty manner in which the work has been executed. But these errors cannot impair the value of our labors, and must be laid to us alone: they cannot affect the doctrines nor the talent of the celebrated surgeon, to whose approbation we owe our success.

We would here testify our gratitude to Dr. Marx for his kind advice, and for the important materials with which he has supplied us. Drs. Paillard and Fournier will also accept our thanks for their kind communications.

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C L I N I C A L L E C T U R E S

ON

S U R G E R Y .

ONE of the immense advantages offered by the surgical clinic of Hotel Dieu, is the great number of curious and obscure cases, which are continually presenting themselves, and which are but little understood. But if this theatre of human misery be rich in cases of every kind, the celebrated practitioner who there calls into action the resources of his talent, receives, and with justice, most of the celebrity acquired in that hospital. Skilful, ingenious, and inventive, as an operator; clear, methodical, and eloquent, as a professor; these are the qualities which recommend the instructions of M. Dupuytren to physicians and to students. We shall esteem ourselves fortunate, indeed, if we impart to the lectures about to be published, but a portion of the interest attached to the words of this practitioner.

ARTICLE I.

PERMANENT RETRACTION OF THE FINGERS,

Consequent upon an Affection of the Palmar Aponeurosis.

THE cause of retraction of the fingers, and particularly of the ring finger, observed M. Dupuytren, has hitherto been almost unknown. When we review the multitude of causes to which it has been attributed, the variety of remedies with which it has been treated, and the number of hypotheses formed in regard to its origin, it is not surprising that it has been considered incurable. Those authors who have attended to retraction of the fingers, have done so but imperfectly. Boyer, in his treatise upon surgical diseases, terms it *Crispatura tendinum*; he says but little on the subject. Perhaps on inquiry, we might find it described in some authors; but my life, which is devoted entirely to action, has not permitted me to make researches, and I shall be happy to learn that my predecessors, who have written on this disease, have discovered its cause and the method of cure.

It has been ascribed successively to a rheumatic, or a gouty affection, to an external injury, a fracture, metastasis of a morbid cause, which sometimes occurs after inflammation of the sheaths of the flexor tendons, or to a kind of ankylosis: we shall point out hereafter, that all these causes are unfounded.

Most individuals affected with this disease have been obliged to use the palms of their hands constantly, and to handle hard bodies. Thus the wine merchant and the hackney

coachman, whose cases we shall mention, were accustomed, one to bore his hogsheads with a gimlet or to pile up his barrels, and the other to keep his whip constantly in action upon the backs of his jaded ponies. We could also cite the case of a diplomatist, who was particularly nice in sealing his despatches. It occurs in masons who grasp large stones, in farmers, &c. We see then already that the disease appears principally in those who are obliged to use the palm of the hand as a point of support.

Individuals pre-disposed to the affection we are describing, observe that it is more difficult to extend the fingers of the affected hand: the ring finger soon contracts; the retraction occurs first in the first phalanx, the others follow the motion: in proportion as the disease advances, the ring finger flexes more and more; at this period, the flexion of the two adjacent fingers is well marked. At this stage of the disease, there is no nodosity before and around the cord presented by the palmar face of the ring finger. Its last two phalanges are straight and movable. The first is flexed at nearly a right angle, and is movable on the metacarpus. In this state the most powerful efforts are insufficient to extend it.

A lady affected with this complaint, in order to be cured, raised different weights, which were successively increased to one hundred and fifty pounds; notwithstanding this enormous weight, she could not counteract the flexion.

When the ring finger is flexed to a great degree, the skin presents folds, the concavity of which look to the finger, and the convexity to the radio-carpal articulation. These folds result from the natural adhesions of the skin with the altered parts. At first view, we should be led to think the skin diseased; but dissection proves the cutaneous envelope to be unaffected. On touching the palmar face of the ring finger, we feel a very tense cord. The summit of this cord is directed towards the first phalanx; we can trace it to the upper extremity of the palm of the hand. In flexing the finger it almost

disappears. On attempting to extend the fingers, the tendon of the palmaris longus is moved, and this motion extends to the upper part of the palmar aponeurosis; the continuity of these two parts explains their simultaneous action. In this fact there is something which will claim our attention hereafter.

But to what shall we attribute the inconveniences of this affection? The ring finger cannot longer be extended, which is also the case in some measure with the fingers adjacent. The patient commonly grasps small bodies: if he seizes objects tightly, he experiences severe pain: the action of grasping is hindered, and causes pain. If at rest the pain ceases, and is not felt violently again, unless the fingers are extended too far.

M. Dupuytren, in his clinical practice and in consultations, has seen about thirty or forty cases of this kind, and cites a great many different opinions as to the cause of the contraction of the ring finger. Some regard it as a thickening and a horny hardening of the skin, not considering that the skin contracts, because it follows the motion of the cause which has determined the disease: others have ascribed it to a spasmodic affection of the muscles; but this explanation is purely hypothetical; for, with the exception of the extension, all other motions are executed easily and with freedom. Many have thought that the contraction was connected with a disease of the flexor tendons, and M. Dupuytren himself entertained this opinion for a long time; but he knew not the nature of this disease: was it an inflammation, was it a swelling, an adhesion of cellular tissue, or a chronic disease of these parts? Dissection was appealed to, to resolve all these questions, and demonstrated that no alteration of this kind existed. Some physicians have ascribed it to a disease of the tendinous sheaths; others to a derangement of the articular surface of the fingers and the lateral ligaments. If we examine the articulation, we see that the surfaces are very extensive, and that they are so united as to be more disposed to flexion, while the motions of extension are less easy. The lateral ligaments are placed on the two sides of the artic-

ulation, and their situation presents an arrangement which it is important to notice. They are nearer the anterior than the posterior plane; whence it follows, that the fingers have a greater tendency to flexion than to extension. But admitting the value of this hypothesis, it is not applicable to men in the flower of their age; besides, it is unsupported by facts. Finally, some physicians believe that the contraction arises from a disease of the articular surfaces, which has caused the ankylosis of the articulation.

We shall not dwell longer on these different hypotheses, said M. Dupuytren; we have mentioned them only because they are connected with the history of the disease. The important point with us is, that an obstacle exists, and that we must seek its cause. A few years since, also, it was thought that the contraction of the ring finger depended on an alteration in the flexor tendons; if, in fact, we look at the projection formed at the anterior part of the finger, this opinion would seem extremely plausible.

This was the state of our knowledge in regard to this disease, when a man who was affected with it, died. M. Dupuytren, who had watched him for a long time, was informed of it, and, happily, this remarkable case was not lost to the science of medicine. As soon as the arm was at his disposal, he procured an exact drawing of the parts, and then proceeded to the dissection. The whole of the skin was removed from the palm of the hand, and from the palmar face of the fingers; the folds and the wrinkles which it had presented hitherto, entirely disappeared: it was then evident that this appearance during the disease was not natural, but was communicated to it: but in what manner and by what cause? The dissection was continued; the professor laid bare the palmar aponeurosis, and was astonished to perceive that it was tense, contracted and shortened: from its lower portion proceeded, as it were, cords which extended to the sides of the diseased finger. In attempting to extend the fingers, M. Dupuytren saw

clearly, that the aponeurosis experienced a kind of tension or crisping: it was a beam of light: he therefore conjectured that this aponeurosis was connected in some measure with the effects of the disease. But it still remained to find the part affected: he cut the prolongations sent by it to the sides of the fingers; the contraction ceased immediately, the angle of the flexion of the fingers was only about one eighth: the least exertion extended the phalanges perfectly. The tendons were entire; the sheaths had not been opened; what then was the change? the removal of the skin and the section of the extremities of the aponeurosis which go to the base of the phalanges. To remove all doubts, and conquer every objection, Dupuytren exposed the tendons; they were of the usual size, and as movable as common, and their surfaces were smooth: he carried the examination still farther; the articulations were in their normal state; the bones were neither swelled nor uneven; they were not in the least affected, either externally or internally: there was no perceptible change in the inclination of the articular surfaces, nor alteration in the external ligaments, nor ankylosis: the synovial sheaths, the cartilages, the synovia, were perfectly unchanged. Hence it was natural to conclude, that the commencement of the disease was in the unusual tension of the palmar aponeurosis, and that this tension arose from a contusion of the aponeurosis, in consequence of the too violent or too long continued action of a hard body upon the palm of the hand. The only thing then desirable was, an opportunity of applying this theory to new facts; and this soon occurred.

The different opinions on the causes of this affection, have necessarily occasioned great uncertainty in the remedies. Several practitioners have thought that the disease was incurable. Dr. Bennati was told by Sir Astley Cooper, in consultation upon the case of Ferrari, an Italian, that nothing could be done. Others, while they admit the possibility of a cure, have pointed out many remedies, most of which have proved

inefficacious. M. Dupuytren having been called to attend several individuals, in whom the ring finger was contracted, has employed successively vapor fumigations, first of an emollient, and then of a sedative character; cataplasms during the day, and sometimes during the night; leeches; frictions with resolvent ointments, and particularly with mercurial ointments, and with calomel; he has also used alkaline, simple, sulphurous and soapy donches, at all temperatures; and all without the least success. Forced by the obstinate character of the disease, M. Dupuytren prescribed permanent extension, by means of a machine invented by Lacroix. The employment of this machine produced no change; on the contrary, violent pains were soon felt in the palm of the hand when the extension was continued too long, and it was then abandoned. Some surgeons had proposed to divide the tendons of the flexor muscles. This operation has been performed twice. In the first case, the tendon was cut in the centre. An inflammation occurred along the sheath, with strangulation. The life of the patient was endangered, and the finger remained flexed. In another case, the division was made lower; no bad symptoms supervened, but the part remained flexed. A long time after these operations, performed by skilful surgeons, M. Dupuytren was consulted for a similar case, by Dr. Mailly. The following account of the case is given by this physician.

RETRACTION OF THE RING AND OF THE LITTLE FINGER.

Relieved by Dividing the Palmar Aponeurosis.

In 1811, Mr. L——, a wholesale wine merchant, No. 25 *quai de la Tournelle*, having received a great many casks of wine from the south, was about assisting his men in arranging them. At the moment of attempting to lift one of the casks, which are generally very large, placing the left hand

below the projecting edge formed by the length of the staves, he felt a crackling and a slight pain in the inner part of the palm of the hand. For some time the hand was tender and stiff: but these symptoms gradually disappeared, so that they attracted but little attention. The accident was nearly forgotten, when he remarked that the ring finger had a tendency to contract, and to incline towards the palm of the hand, and that he could not straighten it like the others. As there was no pain, this slight deformity was neglected. It gradually increased, the bending being more remarkable every year. Early in 1831, the ring and the little finger, were perfectly flexed, and laid on the palm of the hand; the second phalanx was folded on the first, and the end of the third rested on the middle of the cubital edge of the palmar surface. The little finger was very much bent, and always inclined toward the palm of the hand. The skin of this part was folded, was drawn towards the base of the two contracted fingers.

Mr. L——, vexed at seeing this deformity increase daily, and desiring to be cured of it at any rate, consulted several physicians. All thought that the disease was situated in the flexor tendons of the affected fingers, and that there was no remedy but to divide the parts. Some wished to cut the two tendons at once, others to divide but one. Dr. Mailly, when consulted, was also of opinion that the disease probably arose from a contraction of the flexor tendons, but he advised the patient to rely solely on the profound knowledge of M. Dupuytren. The professor, on looking at the hand of Mr. L., stated that this affection was not situated in the tendons, but only in the palmar aponeurosis, and that a few incisions upon this aponeurosis, would give the finger perfect freedom of motion. The operation was agreed upon the 12th of June, and M. Dupuytren, assisted by Drs. Mailly and Marx, proceeded as follows.

The hand of the patient being fixed firmly, he commenced by making a transverse incision ten lines long, opposite the

metacarpo-phalangean articulation of the ring finger: the bistoury first divided the skin, next the palmar aponeurosis, with a distinct crackling. The incision terminated, the ring finger became straight, and could be extended almost as easily as in the natural state. Wishing to spare the patient the pain of a new incision, M. Dupuytren attempted to extend the section of the aponeurosis by gliding the bistoury transversely and deeply below the skin, on the side of the cubital edge of the hand, to disengage the little finger, but it was in vain. He was able to dilate the incision of the aponeurosis but slightly: consequently, he determined to make a new transverse incision, opposite the articulation of the first and second phalanges of the little finger, and thus to detach its extremity from the palm of the hand; but the rest of the finger was immovably attached to this part. A new incision was then made, dividing the skin and the aponeurosis, opposite to the corresponding metacarpo-phalangean articulation. This was attended with slight success, but the operation was still imperfect. Finally a third and last incision was made transversely, opposite to the centre of the first phalanx, and the little finger was soon extended with the utmost facility: this result indicated that the last division had intersected the point of insertion of the aponeurotic digitation. A slight flow of blood followed the incisions. It was dressed with dry lint: the little finger and the ring finger were then extended by the aid of an apparatus adapted and fixed to the back of the hand.

The day of the operation, and the night following, there was little or no pain, and only some uneasiness caused by the continual extension of the hand. The next morning, the back of the hand was slightly puffed, owing to the compression of the machine, which was constructed in a rough manner, by an unskilful workman. The morning of the 14th, the hand was dressed with an instrument invented by Mr. Lacroix, consisting of a semi-cylinder of pasteboard, terminated by four metallic blades extending or shortening at plea-

sure, and terminated by a kind of thimble, to embrace the extremities of the fingers. The patient seemed at first to feel easy; but in the evening irritation existed, the pain increased, and the whole hand was swelled. M. Dupuytren did not remove the bandage, but ordered the hand to be wet constantly with a solution of acetate of lead in cold water. By these frequent ablutions, the pain and tension were diminished, and the state of the patient was improved.

On the 15th, the lint was removed, and suppuration was scarcely established: the hand was still engorged, and there was some degree of pain and tension felt in every part of the extended fingers. The extension was kept up in the same degree, and the fomentations of the lead were continued. The 16th, the hand was but slightly puffed, and the fingers were stiff: suppuration was completely established. The 17th, the symptoms still diminished in intensity, and the fingers could be extended a little more without pain. Finally, the following days, the puffiness and swelling disappeared, and the wounds began to cicatrize but slowly, on account of the separation between their lips, caused by the forced position in which the hand was designedly kept. Nevertheless, the cicatrization was complete, in all the wounds, by the 2d of July. The manner in which it occurred, deserves to be noticed; in fact its progress was in relation with the different degree of influence exercised by the extension upon each of the fingers.

Thus we saw close successively, 1st. the wound corresponding to the articulation of the first and second phalanges of the ring finger: 2d. the part opposite the centre of this same first phalanx: 3d. that connected with the metacarpo-phalangean articulation of the little finger: 4th. finally, that first made, and which corresponded to the metacarpo-phalangean articulation of the ring finger. The patient continued to use the machine for extension for more than a month, in order to prevent the approximation of the edges of the divided aponeurosis, and to obtain distinct cicatrization. When the apparatus

was removed, the patient could flex his fingers with ease ; the only thing to prevent this being the stiffness of the articulations, owing to the state of continual extension in which they were kept. But this stiffness will soon disappear, when the patient is allowed to move the fingers.

August 2, Mr. L. wore the apparatus only during the night, and the articulations already began to assume a slight degree of suppleness ; whence it is concluded that the use of the flexor tendons is unimpaired, and that in a little time the fingers will regain their natural motions.

The above case leaves no doubt in regard to the cause of the disease. M. Dupuytren's opinion, then, is the only true one ; the only one in accordance with the facts.

The manner in which the palmar aponeurosis may cause such effects, will be readily seen by a short description of this fibrous envelope. The superficial palmar aponeurosis is formed partly by the expansion of the palmaris brevis muscle, and the prolongation of the anterior annular ligament of the carpus. It is extremely strong at its origin, but grows thinner as it advances, so as to give rise towards its lower edge, to four fibrous slips, which are directed towards the lower extremity of the last four metacarpal bones. When there, each of them bifurcates to allow the flexor tendons to pass, and each branch of this bifurcation is attached to the sides of the phalanx, and not forward as many anatomists have thought. These prolongations are more tense than the aponeurosis, and must be cut. When the skin and the aponeurosis are dissected, it is a little difficult to separate them, on account of the cellular tissue and the fibrous prolongations which arise from the aponeurosis. These adhesions explain the wrinkling and the motions of the skin. In cutting the fibrous prolongations, there is reason to fear lest the nerves and vessels may be injured, but when the aponeurosis is tense, it forms a kind of bridge which protects them, so that it may be divided without danger. The use of the palmar aponeurosis is to keep in place

the tendons of the flexor muscles, to preserve the form of the anterior concavity, and to protect the different parts of the hand. In those animals who perch it is very distinct and is remarkably elastic. Such are the functions generally attributed to the palmar aponeurosis ; but it has others, by which it tends constantly to bring the fingers to a state of semi-flexion, which is also their state of rest ; it is an unusual increase in this function produced by a disease which causes the retraction of the fingers. The cause of this retraction then, particularly that of the ring finger, is now well known, and its treatment is established upon fixed rules : hence we can easily conceive of the success of the operation performed December 5th, by M. Dupuytren.

The subject of this case was a coachman about forty years old. For several years, he perceived his fingers, and particularly the ring finger, contracting towards the palm of the hand ; when he came to the hospital, the fingers were flexed so as to be only an inch and a half distant from the palm of the hand ; the skin of the palm formed folds, the concavity of which was turned towards the fingers. If the phalanges were extended, a kind of cord was observed, proceeding from the finger to the palm of the hand. The disease affected both hands. The diagnosis could not be doubtful.

The patient sat in a chair. M. Dupuytren took the right hand and moved the fingers ; he saw plainly the tension of the aponeurosis : he then, with a curved bistoury, made semi-circular incisions ; one at the base of the ring finger, in order to cut the two digital and lateral prolongations of the palmar aponeurosis which go to this finger, the other, an inch and a quarter below the first, in the palm of the hand, in order to divide this digital prolongation again, and to separate it at its base from the body of the palmar aponeurosis. These incisions terminated, the ring finger assumed its normal position immediately : but little blood escaped. The patient being very feeble, M. Dupuytren left the operation on the left hand until

another day. The wounds were dressed as in the preceding patient, and the termination of the case will doubtless be favorable.

The facts we have mentioned prove incontestably that the retraction of the fingers depended in these cases, according to the symptoms stated by M. Dupuytren, on a contraction of the palmar aponeurosis, and particularly of the prolongations sent by it to the base of the fingers; and that this disease may be cured by cutting transversely these prolongations, and the part of the aponeurosis which supplies them.

Three cases are not sufficient to establish a general truth, but they cannot fail to awaken the attention of scientific men and of practitioners to the subject. Probably they will thus become profitable to science and humanity, by multiplying the observations on the causes, signs, effects and treatment of this disease, and particularly on the operation of M. Dupuytren for its cure. I request these observations, added the professor in conclusion, with my whole heart, even should they contradict my results: my desire above all, is to serve the cause of humanity, to which I have devoted my talents and my wishes. But it should be remembered, that all analogous cases are not similar; that the same methods are not applicable to all of them; that the most celebrated remedies may be depreciated, and even rendered disreputable, by false applications: as, for instance, should this method be applied to retractions of the fingers produced by rheumatism, gout, &c.

ARTICLE II.

DIFFERENT CAUSES OF PERMANENT RETRACTION OF THE FINGERS, AND THEIR DIAGNOSIS.

IN the preceding lecture, remarked M. Dupuytren, we stated that this disease might be produced by many different causes, and we insisted more upon this subject, because the same remedy was not applicable to every case. Thus, it is evident that if the crisping of the palmar aponeurosis be confounded with a disease of the tendons, a very serious error would be committed.

In order to enable you to distinguish the different diseases which might erroneously be attributed to an affection of the palmar aponeurosis, we shall bring before you a great number of individuals affected with retraction of the fingers, produced by different causes. The first patient I shall present to you, is a porter, seventy-four years old, who for some years has been a scavenger. This man was wounded five or six years since, in the palm of the hand, with a piece of wood; about two years since, he observed that the middle and ring fingers of the right hand began to contract: the disease has made great progress since. He imputes it to a very serious cold with which he was affected, during a severe winter. At present, the fingers are flexed nearly one quarter. It is impossible to straighten them, whatever be the degree of force used. Two tense cords which are prominent and hard, go from the centre of the palm of the hand, to the base of the contracted fingers. On attempting to extend them, these cords become more pro-

minent, and the tendon of the palmaris longus moves and extends along the lower part of the fore arm. I have selected this instance of true retraction, in order that the presence of the characteristic sign may serve as a guide to distinguish it from the diseases which resemble it.

In other cases, one or more fingers may be flexed on the hand, and no crisping of the aponeurosis exist. The arrangement of the parts may then depend on an alteration in the phalanges. This is the case in the two individuals you are now about to see.

A young man about fourteen years old, was affected with a white swelling of the tibio-tarsal articulation, and finally employed M. Sanson for this disease. On examining him, a contraction of the little finger of the left hand was observed : this affection had existed a long time, and was referred to his early youth. The finger, as you see, is curved in a semi-circle : the first phalanx is immovable on the second, and the second on the third. It is impossible to move them upon one another, but the articulation of the first phalanx with the fifth metacarpal bone, is perfectly free. It can be carried back very forcibly and as in the natural state. When these different motions, and particularly that of extension, are executed at the articulation, we cannot trace any cord from the palm of the hand to the base of the finger. Here, then, there is an affection of the phalanges, and not of the palmar aponeurosis.

The second subject presents symptoms exactly similar : thus, in these two instances, the absence of the cord, the extreme mobility of the metacarpo-phalangean articulation which can be moved in every direction, the immobility of the second phalanx on the first and of the second on the third, are the signs which distinguish the disease particularly, and show an ankylosis of these articulations.

A cicatrix formed by a wound may resemble a cord, but this is superficial, and the cause of it also is known. In the fourth individual before us, the last two fingers are constantly bent

towards the palm of the hand. They however can easily be extended: no cord exists, all the articulations of the phalanges with each other and those of the finger with the metacarpus, are perfectly free. To what then must this continual flexion of the fingers be ascribed? The patient received a cut from a sabre on the back of the hand. The extensor tendons of these two latter have been divided: the divided ends did not unite, and the flexors having no antagonists, keep the fingers constantly against the palm of the hand. Consequently in this patient there is no retraction, but a passive flexion of the fingers, and an impossibility of extending them in consequence of the division of the extensor tendons.

A contused wound, also, may produce similar results; this in fact is the case with the fifth patient who is presented to your notice. This individual is affected with a retraction of the little finger which is curved in the arc of a circle: all the other articulations are very movable, as is also that which unites the first phalanx with the fifth metacarpal bone; there is no cord visible in the palm of the hand; the flexor and extensor tendons of this finger are healthy. The contraction in this case depends on a disease of the skin; a great portion of this has been destroyed by a contused wound produced by a carriage wheel. This wound was cured by an approximation of its edges, and not by producing a new cutaneous tissue. Hence there is a narrow cicatrix which prevents the extension of the little finger.

Burns in the palm of the hand frequently produce this effect when they are treated improperly, when, instead of keeping the fingers in a position which separates the edges of the wounds, and allows a new cellular tissue to form, they are so placed that the edges of these wounds with loss of substance are in contact. Hence adhesions, &c., are formed, which prevent motion, and produce contraction, but in this case there are no prominent, hard and tense cords in the palm of the hand.

Retraction in consequence of the deformity of the articular

surfaces of the phalanges occasioned by certain professions, is also common. Females, for instance, who knit and weave, and who are obliged to keep their little finger separate from the others, and strongly bent for a long time to keep firm the flaxen, linen or cotton thread, often have a contraction of this finger arising from a deformity of the lower extremity of the first phalanx, of the upper extremity of the second, and of the corresponding extremities of this and the third. This deformity was more common formerly than it is now. It is said, however, to be frequent in Germany, where the females of Berlin, Dresden, &c., walk with their work in their hand.

Here, continued Baron Dupuytren, is a young and healthy female lace-worker, in whom the four fingers of each hand are contracted towards the palm. They form about a quarter of a circle, but the metacarpo-phalangean articulations are perfectly loose. They may be easily turned on the dorsal face of the hand, and in this forced motion of extension, there is no cord or prominence to be seen. This, however, is not true of the two phalanges on the first; they cannot be straightened, on account of an insuperable obstacle depending on a deformity of the articular surfaces of the extremities of the first and second phalanges, a deformity produced by the kind of labor in which this young girl was occupied.

Here also, continued Baron Dupuytren, is another case of flexion of the fingers, entirely unconnected with disease of the palmar aponeurosis. The patient now before you is a tailor. You know that in individuals of this profession, the right hand is constantly flexed. It is impossible for him to extend the ring finger, and even the attempt is very painful; but there is no appearance of a lesion in the palmar face of the hand. The cause of the affection is in the articulation of the second phalanx with the third, where is developed a serous tumor of the character of an accidental synovial cyst. The nature of this affection is easily remarked: it is then impossible to confound this flexion of the fingers with that produced by any

other cause. Retraction of the fingers resulting from wounds of the flexor tendons, might at first view be considered a real contraction ; but the prominence formed by the tension of the aponeurosis is much more superficial, and will not yield to any effort at extension. While in the disease of which we are treating, in extending the fingers, the tendon of the palmaris longus is depressed, and the prominence almost entirely disappears.

You have before you a seventh patient, in whom the middle finger is retracted. This finger is curved in a semicircle : from its lower extremity or pulp is a cutaneous cicatrix in the form of a membranous prolongation which goes to the loose edge, and in which a hard rounded resisting cord may be felt : this is the tendon. The patient has had a whitlow, and the surgeon who treated it, made a deep incision in the middle finger and opened the sheath of the tendon in its whole extent, whence its displacement and the retraction of the finger.

The wound of an articulation is also one of the numerous causes of retraction. This is the case with the eighth patient now before you. The index finger of the right hand is flexed. This flexion consists in a powerful inclination of the third phalanx on the second towards the palmar face. It is impossible to move this articulation in the least. The ankylosis is perfect. The patient has received a blow from a sharp instrument, on the dorsal face of the finger which penetrated into the articulation. Inflammation supervened, suppuration followed, and fusion occurred. The other articulations are movable.

Let us mention another fact. An engraver in the rue Castiglione, in May, 1831, was shot by a thief who was stealing the lead from the roofs of the adjacent buildings. The pistol-ball entered the fore-arm from before backward at its upper and inner part. The ball merely passed through the flesh and did not touch the bones. The cubital nerve was cut, and immediately the inner part of the fore-arm and the last two fingers of the hand to which this nerve is distributed, were

paralyzed. When called to the patient, said Baron Dupuytren, I laid open the wounds to prevent all kinds of strangulation, and I applied a simple dressing: though bad symptoms supervened, the wound was healed in a month. The paralysis, however continued, and was attended with a retraction of the last two fingers towards the palm of the hand on which they rest. The articulations of the fingers and of the phalanges are very loose, and very movable; but when we attempt to extend the fingers, there is considerable resistance; the patient experiences severe pain, and considerable tension at the cicatrix. A portion of the flexor muscles being removed they are shortened, and cause a permanent and unnatural state of flexion of the last two fingers of the hand.

Thus, among the cases we have mentioned, in order to establish the diagnosis between the different kinds of retraction of the fingers, we find they are produced by a real crisping in the articular surfaces of the phalanges, by the division of the extensor tendons, by too narrow a cicatrix of the skin, by the destruction of the fibrous sheath of the tendons, and finally by the disease or loss of substance in the flexor muscles of the fingers.

We were anxious, continued the Baron, to present to you a pathological specimen, which should leave no doubt in your minds as to the seat of the disease mentioned: we have been very fortunate, and now present to you, the arm, fore-arm and hand of an individual affected to a marked degree with retraction of the fingers. I have carefully dissected these parts, and you shall judge for yourselves of the correctness of all my statements. The tendon of the palmaris longus, and the palmar aponeurosis, have been separated from the subjacent parts; I request your attention to what takes place in the different experiments I make. If, for instance, the flexor muscles contributed to produce this disease, it is evident that if we draw them as I now do, they would increase the retraction very much, but this is not the case: for although I pull upon the

superficial or deep seated layer, the cord placed in front of the last two fingers is not changed. If, on the contrary, I extend the phalanges on the back of the hand, the cord becomes extremely marked, yet the flexor tendons are moved but slightly. Farther, if the flexors had any effect on this disease, the section I am about to make of their superficial and deep seated layer above the thumb, would remove the cramping of the fingers, and you see, continued the professor, that it has not. The division of the tendons in the palm of the hand has the same effect. But if the tendons have no effect on the retraction of the fingers, this is not true of the palmar aponeurosis : in fact, you perceive that the slightest traction of this, increases the curve of the fingers towards the palm of the hand : if we extend the fingers on the dorsal face, the cord becomes stiff, tense, and is formed exclusively by the aponeurosis ; this, in fact, is distinct from all other parts, so that it is easy to see that it is the only obstacle to the extension of the last two fingers. All doubts are already dissipated ; but if any remain, a last experiment will remove them : it is the division of the aponeurotic expansions which go to the fingers. This section, in fact, is no sooner terminated than the flexion disappears, and the fingers return almost to their normal position. It is evident that the apparatus used on the living would cause a perfect cure.

When opportunity presents, we shall speak of retraction of the toes, which is also caused by a cramping of the plantar aponeurosis.

ARTICLE III.

CONSEQUENCES OF THE DISCHARGE OF A PISTOL BELOW THE CHIN.

WOUNDS by fire arms cannot be subjected to more or less fixed rules, as are fractures and dislocations. The course of the projectiles, the accidents they cause, and their consequences, require on the part of the surgeon the resources of all his talent, and a sound judgment. Wounds of the head, resulting from attempts at suicide, demand particular attention. We would here cite a number of curious cases, if we were not confined to the surgical department of the Hotel Dieu. The following case ought, however, to be distinguished among those relating to the same subject.

Charles Mercier, aged thirty-six, a soldier, born at Brecy, department of Ardennes, entered Hotel Dieu, March 3, 1831, to be treated of a frightful deformity, situated in the lower jaw. This man had served with distinction for fifteen years, in the sixth dragoons, but according to his story, was unable to gain the good wishes of the colonel, who neglected no opportunity of showing towards him his ill-will.

In August, 1830, numerous promotions in the regiment occurred, and he was selected as quarter-master general, and would infallibly have been promoted, had it not been for the powerful intervention of the colonel, who formally opposed his nomination. Mercier saw himself suddenly deprived of the rank to which he had long aspired, and of which he thought himself deserving. He could not bear this injustice, became disgusted

with life, and resolved to destroy himself. For this purpose he armed himself with a horse pistol, loaded it with two balls, placed it under his chin and fired. The muzzle of the pistol was directed obliquely forward, for the lower jaw alone, and the soft parts which covered it, were affected, but they were terribly lacerated. The lower maxillary bone was broken into shivers, and most of it destroyed; viz. from the canine tooth of the right side, to the ramus of the left. The lower lip, (except half an inch on the left,) and the soft parts which cover the chin to the hyoid bone, were blown away. These serious wounds occasioned but slight general phenomena; in two months, the wounds were cicatrized, but these cicatrices were horrid; nothing had been done to diminish the deformity, and to prevent the dribbling of the saliva. The deformity was increased also by the contraction of the masseter and internal pterygoid muscles, which being no longer counterbalanced by their antagonists, had gradually raised the fragment belonging to the right branch of the lower maxillary bone, to the level of the *alæ nasi*, where it projected like a tusk, raising the lower lip. In this state, the patient came to consult me at the hospital, on the 23d of March last, determined to submit to any treatment which could relieve the deformity. An enormous hiatus existed between the superior maxillary and the hyoid bone. This hiatus was nearly triangular, and presented an upper edge formed by the upper lip, and two lateral edges, which converged to meet the hyoid bone: the left lateral edge, which departed from the commissure of this side, was formed above, and to the extent of half an inch, by a remnant of the loose edge of the lower lip: the right lateral edge was composed entirely of the soft parts of the cheek, and the neck; the upper lip, at its point of union with the right lateral edge, was raised by the portion of the lower jaw already mentioned, and presented the canine tooth projecting like a tusk: add to this description a constant dribbling of saliva, and you will have an idea of this horrible deformity. What was to be

done? Could the portion of the maxillary bone be preserved, and be used in mastication? to attain this end, we must first depress it. This depression could not be accomplished, except by first dividing the masseter and internal pterygoid muscles, and when these muscles were once divided, how could the jaw be raised? This operation would be useless to the patient: we must then confine ourselves to remedying the deformity, by removing the projecting portion of the maxillary bone. We must also endeavor to form a lip, and reunite the wound in a great part of its extent. How shall we remove the maxillary bone? By making a transverse incision in the cheek on the right side, exposing the bone, and using a chain-saw.

The lip on this side must be made from the cheek, and the wound reunited by a twisted suture after the edges have been exposed.

The operation was performed the 16th of April in the following manner: a transverse incision an inch and a half long, was made in the cheek on the right side, where the upper edge of the fissure united with the right lateral edge. The maxillary bone was exposed and separated. The saw was carried behind the second great molar tooth and the bone was divided in a few seconds. The lateral edges of the fissure were then pared off with a bistoury: the right in its whole length, the left to the point where a remnant of the lower lip still existed, which remnant must be used. M. Dupuytren then proceeded to unite them. The wound of the cheek was united by two stitches: in making this union, M. Dupuytren was careful to draw in the lower flap, which projected an inch beyond the upper, and thus contributed to form the lower lip: the lateral edges were then brought together, in the parts exposed, by a suture of five stitches. The longitudinal wound united perfectly, except at the junction of its three lower fourths with the upper fourth, where the tissues which had become fibrous, were inextensible. This suture was favored by a bandage, and by graduated compresses, which brought

the integuments firmly forward. The fifth day, the needles in the wounds of the face were removed, and its edges had united perfectly. It was thought proper to leave those in the neck much longer in place, and when they were withdrawn, on the eighth day, we could see, that the wound was united above and below, that the lower lip was formed, but that in the point corresponding to the fibrous tissues, that is, for the extent of about an inch, union by the first intention had failed, and the needle had cut the lips of the wound. There was still hope of obtaining cicatrization, by the second intention: for this purpose, the lips of the wound were approximated by graduated compresses, and straps of diachylon were applied behind the ears, and brought the skin forward, crossing on the median line. These means were continued for a month, and aided by the cauterization of the lips of the wound, accomplished all that could be expected. Two months after the operation, there was merely a slight opening, through which a little saliva escaped. Will this small fistula close? We hope so. However, this may be, the patient has to regret only the loss of the jaw which human art cannot restore to him, in place of this large fissure, which left the whole mouth exposed. There is a cicatrix, and the patient possesses a newly formed lip.

We have not mentioned in this case, any general phenomena, because they did not appear. The patient was nourished with milk, which he took from a sucking bottle.

ARTICLE IV.

CATARACT.

Species, Operations, and Treatment.

ELEVEN patients affected with cataract, have recently been operated upon at Hotel Dieu, by Baron Dupuytren, in the mode generally employed by him, viz., depression. These patients have afforded him an opportunity of setting forth the luminous principles long professed by him on this affection, his improvement in this interesting part of surgery, and the practical consequences deduced from his great experience, from his numerous observations. For these reasons, we propose to present to our readers, an abstract, or rather an analysis of the doctrines of this celebrated surgeon on cataract, on the operations, and on every thing connected with the operation and its consequences. This is also the method we shall follow for each surgical department of the clinic of the Hotel Dieu, because we consider it as conveying the most instruction to pupils, which is the object we have more particularly in view in our enterprise. In this manner, they will have before them, not only the professor's remarks in a recent lecture on one or several similar cases of surgery, but also a summary of the most important points of doctrine taught, in preceding lectures on the order or kind of diseases to which these special cases refer. Readers will understand that this method presents to them the precious advantage of profiting at the same time by the clinical instruction of the present and preceding years, an

advantage which they can now obtain from no publication. They will understand also, that by connecting with individual cases, as they presented themselves to the professor's observation, a multitude of facts and considerations which he has mentioned before, we shall gradually exhaust all the generalities : and at some future period, our subscribers will find in our lectures, a complete treatise on practical surgery by Baron Dupuytren. Farther, they will see, that if we confine ourselves to mentioning in this series, the distinct facts of which the professor treats in each lecture, we shall attain our end but imperfectly. Finally, the plan which we indicate, will not prevent us from stating the history of a particular case separately, and in all its details, whenever it gives origin to important remarks from Baron Dupuytren : it will not prevent us from recurring to a subject already treated of in a general article, if the professor should be induced from the interest it has excited, to recur to it again. This is the view taken of our task, and its accomplishment is by no means easy.

CATARACT, like many other diseases, has been divided into a certain number of species. *Simple* cataract consists in an opacity of the crystalline lens. Another species, nearly as common as the preceding, results from an opacity of the crystalline membrane. This is termed *membranous* cataract. The latter, according to M. Dupuytren's observations, is to the common cataract, as one to one and a half. It is particularly frequent in children, in whom it is sometimes congenital, and in whom Saunders has observed it, twenty-one times out of forty-four cases. It is then most commonly perfect, very rarely imperfect. In adults, it usually forms after blows, contusions, and pricks, received on the globe of the eye. It occurs also in scrofulous individuals, and in those who have submitted to the operation of extraction, and where the capsule was not displaced. Finally, when imperfect, it presents itself in variable forms. The most common is that which Saunders terms the *central*, and which was observed long since by M. Dupuy-

tren : it affects the centre of the crystalline capsule. It is sometimes congenital, but generally supervenes after birth. It is known by a prominent opaque and pearly point, situated in the centre of the capsule. This point is depressed and sometimes divides in radiating filaments, as it approaches the circumference of the lens : so that as the whole of this part preserves its transparency, vision can still exist. This variety of cataract is always attended with a convulsive motion of the eyes, which turn on their axis, to present successively, the transparent points of the membrane to the light. The eye-lids, and sometimes the head, are affected with a similar motion, and for the same purpose.

Next to this variety of cataract, and the most frequent, is that termed the *milky*, *soft*, or *pulpy* cataract. In this case, the whole of the crystalline lens is very soft : sometimes, however, this softness is only partial : frequently even the lens is entirely changed into a white, milky, opaque liquid. The crystalline membrane and the lens are sometimes more or less incrustated with phosphate of lime, and become of a bony hardness ; this is easily recognized by the shock produced by the touch of the instrument against the organ. Cataract in this case, takes place by ossification. Finally, according to some authors, cataract presents another variety, termed *black cataract*. This must be perfectly distinct from amaurosis, and must show itself by certain sensible signs : sometimes reflecting several colors at once, sometimes brown, and sometimes green, sometimes radiated with white striæ, which extend on a dark base, and in all cases attended with great mobility of the iris. Many surgeons, and among others, Delpech, have denied their existence. Baron Dupuytren, in his vast practice, has never seen a case of black cataract ; and therefore he does not admit them. We have often heard him mention the following fact : Pelletan and Giraud imagined that one of their patients was affected with a cataract of this kind ; they requested M. Dupuytren to examine it, who pronounced the disease

to be amaurosis. After some disputes, Pelletou and Giraud persisted in their opinion, and requested him to operate in order that he might be convinced. Baron Dupuytren performed the operation, and extracted a perfectly healthy lens. The operation was followed by no accident, but the patient continued to be deprived of sight, the retina being paralyzed.

Several facts observed at Hotel Dieu, have led Baron Dupuytren to admit a *hereditary disposition* to contract cataracts. We shall mention but one instance, which occurred at the public consultation, which seems to leave no doubt as to this disposition. Perhaps there is no example so remarkable.

An aged lady came one day to the consultation, attended by a part of her family. When more than sixty years old, her sight began to be affected; eighteen months afterward, the two crystalline lenses were entirely opaque. The depression of one of them, as performed by M. Dupuytren, was followed by no accident, and restored to the patient the faculty of sight, which she has since retained; since at the age of eighty, it is remarkably good. The cataract of the opposite eye has not been operated upon.

The sight of her daughter began to fail when she was twenty-eight years old: she was soon unable to go about, but she could distinguish day and night: the pupils were movable, the eyes healthy. When thirty years old, two years after the origin of the affection, Baron Dupuytren performed on one of the eyes of this patient, the same operation which had restored the faculty of sight to her mother. Ten years afterward, vision was unaltered on this side. Encouraged by this success, the patient wished to be relieved from the other cataract. The newspapers were filled with the puffs of an oculist; she applied to him, and the operation was performed by extraction. But, as happens in most cases, this operation was attended with other consequences than the preceding: severe pains and an intense inflammation prevented the cure; the cornea became

opaque, and the patient lost her eye, while that operated on by Baron Dupuytren was not deranged in its functions.

The son of this lady, aged seventeen years, had, likewise, two cataracts. They were depressed at Hotel Dieu, and also cured.

With him the grandmother brought to M. Dupuytren, another grandson, in whom the lenses had begun to be opaque, and finally a grand-daughter, whose sight was already obscured, as it were, by a cloud; a precursory symptom of the opacity of the lens. Here then were a grandmother, her daughter, and three grand-children, all affected with cataract! This case is curious, both on account of the disposition of this family to this kind of affection, and for Dupuytren's success.

This professor has had occasion to operate upon a great number of congenital cataracts, and to make some remarks on the consequences of these operations, which will be read with interest. But, he says, I must here observe, that I have never seen the strange things mentioned by several authors, nor have I heard remarks from persons I had restored to sight, upon the distance, form and color of objects, which remarks have caused so many commentaries on the part of metaphysicians and idealists. On the contrary, I have most commonly remarked that those who are blind by cataract, whether congenital or existing for many years, being accustomed to live with but four senses, were generally embarrassed with this, the use of which had been restored to them. They have had trouble in combining its action with that of the others: they have often shown so much reluctance in using it, that I have been compelled several times, to deprive them of one, and even of two of their senses, to induce them to exercise the power of vision. Thus, I have been obliged to stop up the ears of a child, who was guided by sounds, or by the impressions he received from touch: he carried his hands constantly before him, as if they were tentacula.

Sometimes, however, the difficulties are so great, that M.

Dupuytren has often failed in re-establishing vision, after completely restoring the organ of sight. Was there, in these cases, a disease of the optic nerves at their decussation, or at their origin? or were these parts wasted by long inaction, and unable to resume the power of acting, as are limbs which are paralyzed?

There are three principal modes of destroying the cataract; by turning the crystalline lens and its appendages from the axis of vision, in order to allow the rays of light a free passage to the bottom of the eye: the extraction of the opaque parts, by an incision through the transparent cornea: the depression or destruction of these parts, by wounding the sclerotics; or, finally, the keratonixis, or the depression and breaking up of these parts, performed from before backward, by means of a needle passed through the transparent cornea.

Professor Dupuytren objects to the precepts given by some authors, viz. always to depress the cataract; and also to that given by others, to divide or break it in every case. He maintains that depression or breaking up requires certain conditions, and hence we cannot judge, *a priori*, which process is preferable. In fact, a cataract which is a little dense, can only be depressed, and never be broken up for want of support: while a soft cataract cannot be depressed in a mass, and must be broken. M. Dupuytren maintains that we must be guided by circumstances, and depress or break up the cataract.

M. Dupuytren, however, prefers depression to extraction: he rarely has recourse to this latter method, and only in certain special cases, where it is manifestly indicated, as, for instance, when the crystalline lens, or its membrane has been so altered in its nature, that absorption is impossible. Breaking is only a modification of depression. This operation consists in piercing the centre of the lens with a needle, destroying its capsule, and scattering the remnants of it in the aqueous humor. M. Dupuytren thinks that about one third of the cataracts which are depressed, may be broken.

One cannot but admit the irrationality of employing the same mode in all cases. In surgery, as in medicine, the same mode of treatment cannot be constantly employed to attain the same end : thus, in cataract, the age of the patient, and circumstances dependent on the form or size of the eye and its appendages, oblige practitioners to recur alternately to one or the other process. In respect to age, if we regard the degree of energy in the absorbent system, we conceive that it is better to operate by depression on children, and on old people by extraction. In the former the functions of life are in all their energy ; the motions of composition and of decomposition are executed with astonishing rapidity : the crystalline lens is absorbed almost as soon as this organ loses its relations and its conditions of vitality : besides, the crystalline lens at this age is never as hard as when more advanced, and consequently it is absorbed more easily. In old people, on the contrary, the motions of composition and of decomposition are slow, and the absorbents, particularly, seem to have lost a great portion of their energy ; exhalation predominates, the lens, also, is frequently very hard, and hence is more difficult to be absorbed. M. Dupuytren has found lenses perfectly entire, two years after they had been depressed, in old persons who had died of other diseases. But other considerations militate in favor of depression in the two ages : children are seldom docile, and are ignorant of what is for their advantage or injury ; they cannot keep their hands from their eyes ; they cannot remain perfectly still during the operation. Hence arise difficulties of extraction, and causes which may occasion the expulsion of the vitreous humor. In old people, the eye is often sunk in the orbit, the edges of the cavity seem very prominent, or rather the globe of the eye is slightly developed : in these cases, particularly, extraction is very difficult : in others, the eye is constantly agitated by rapid and convulsive motions : finally, it is always remarked that when an individual has been for some time deprived of sight, he seems also to lose the power

of keeping the eye fixed ; the motions of the globe of the eye are no longer controlled by him, and this circumstance frequently increases the difficulties of depression.

In preferring depression to extraction, M. Dupuytren has modified the manual operation in some measure. The needle used by him is not the old spear-pointed needle, nor the crooked needle of Scarpa, but he employs the spear point of one and the curve of the other : the blade is long and narrow, curved on one face, very finely pointed with very sharp edges, and the size of the shank is exactly proportional to that of its blade ; hence it is equally adapted to pricking, dividing, seizing and displacing ; it yields to the hand, and moves without effort, and without allowing the vitreous humor to escape. For fifteen or twenty years, this instrument has been used by most practitioners, and it is known by the name of its author. In all cases which require extraction, M. Dupuytren uses Richter's knife, which he prefers to Lafaye's, as it acts by cutting, while the latter acts by pressure.

Depression, when the cataract is simple and not complicated, is performed according to the old method, and the crystalline lens is depressed in a mass, or divided and broken, according to circumstances. When the lens is depressed, and the capsule is torn with the needle, and has been removed by this instrument, M. Dupuytren always examines carefully if the capsule be perfectly clear and free. If any portions of it remain, they are brought into the anterior chamber, where the absorption is more active than in the posterior. The same mode is followed when the operation is performed by breaking up the opacity of the lens. If the cataract be membranous, whether the capsule be complete or partial, whether it be or be not complicated with opacity of the crystalline lens, it is treated exactly as in the preceding cases, and depression is always preferred to other processes. In fact, this variety which is so interesting in its pathological history, has really no particular importance in regard to the operation. In the partial or im-

perfect milky cataract, depression is necessarily performed by breaking, and the fragments which are too soft to be properly divided, are scattered by the instrument in the aqueous humor. But when the softening is arrived to its greatest degree, and only a thick liquid remains within the crystalline capsule, it necessarily escapes within the eye, as soon as this capsule is divided by the needle, and then the obscurity of this organ entirely conceals from the operator the motions of his instrument. In these cases, M. Dupuytren wisely resolves to suspend the operation, and to wait until absorption has re-established the clearness of the eye, before he recommences it. We shall not mention the operation for ossified cataract: it is evident that the only way to treat this case is by extraction. To perform it, the foreign body is seized in such a manner by means of forceps, that one of its edges presents at the opening of the pupil. According to those authors who admit the black cataract, the greatest difficulty in these cases is the diagnosis. When the color of the crystalline lens is only brown, or shaded by several luminous reflections, the case admits of no doubt: but if it be entirely black, for instance, we do not know positively whether cataract exists. In all cases, M. Dupuytren acts, and recommends to act, first as if there was an amaurosis, and does not decide upon the operation, until the means employed to cure this last affection are unsuccessful. In fact, we can conceive that even when this operation is useless, or followed by bad consequences, the patient experiences no bad effects from it, since he has lost the faculty of seeing whether operated upon or not.

About twenty three years since, M. Dupuytren was unexpectedly led by an accident to perform the operation for cataract in an unusual manner. Being unable to fix the eyes of a young girl affected with accidental cataract, and to attack the anterior and external part of the sclerotica, to depress it, he resolved to transfix the transparent cornea, the only part of the eye which the convulsive motions of the muscles left visi-

ble, and to carry the needle to the crystalline lens by passing it through the pupil; this operation was perfectly successful. But as he had penetrated into the eye through the transparent cornea from necessity rather than from choice, he did not consider this manner of operating as one which ought to be adopted. Further he was ignorant that this operation had been performed before he did it, and was employed in other countries, and particularly that it was indicated as a regular process. Its reputation, however, in Germany, and the advantages attributed to it, attracted his attention to this mode; he resolved to perform several operations by *keratonixis*, as it is termed, depressing or breaking up the cataract from before backward, after pricking the transparent cornea with a needle. After subjecting the patients to the preparatory treatment, which we shall mention hereafter, as employed for operating by other methods, M. Dupuytren causes an aid to raise the upper eyelid, while he himself depresses the lower lid with the middle finger of his left hand, being careful that the loose edges of both are retained; he then directs forward the point of the needle described above, and the concavity of its curve upward, plunges it into the cornea, which has previously been dilated, at the lower part of the pupil, and assists the action of the needle by pushing its convexity with the index finger of the right hand, while he presses it from above downward, and from before backward with the other hand. Passing through the cornea, the point of the needle is guided into the anterior chamber, into the pupil, and even upon the crystalline lens; at this point, if he proposes to depress this body in a mass, he turns the needle on its axis, so as to bring the convexity of the curve upward, gliding the point between the upper part of the circle which confines the pupil and the upper part of the lens, and includes the cataract in the cavity of this instrument: then elevating the handle of this latter, and depressing its point, he depresses the crystalline lens below the level of the pupil and the axis of the rays of vision. If he wishes to divide

the cataract, he sometimes presents the cutting edges and sometimes the point of the needle, to the crystalline membrane and lens, which he divides and disperses as far as possible from the axis of the rays of sight. The operation concluded, M. Dupuytren withdraws the needle in the position in which it entered the eye ; he covers the eyes with a bandage, excludes the light entirely from the bed of the patient, and prescribes diet and rest. He attempts to prevent bad symptoms, but if they supervene, he meets them with proper treatment.

Since 1819, M. Dupuytren has experimented upon this operation, in order to determine its advantages or disadvantages compared with other methods. The conclusions to which he has arrived, are : 1st, that keratonixis is not generally an easier operation than that performed through the sclerotica. 2d, that the facility it presents of being performed on both eyes with the same hand is but a slight advantage, especially to those persons who, like himself, operate equally as well with either hand. M. Dupuytren, however, thinks it preferable to the puncture of the opaque cornea, and that this circumstance would make him prefer it to the puncture of the sclerotica, if it did not offer other inconveniences. It also follows from the remarks of the professor, that, 3d, the position of the hand and of the needle between the eye of the operator and that of the patient, does not allow us to follow with facility the motions of the instrument nor those of the cataract, especially at the time when we are obliged to raise the hand and the handle of the instrument to depress it : 4th, that the circle which borders the pupil, confines the motions of the needle and prevents it from easily displacing the cataract, from plunging it into the lower part of the vitreous body, and especially from detaching the folds of the crystalline membrane, which adhere so frequently to the ciliary processes : 5th, that keratonixis neither prevents nervous symptoms nor those of inflammation, which have been adduced against operations by depression performed through the sclerotica ; a remark which is much more important, since the

pretended safety and ease of this operation, caused it to be preferred by the Germans: 6th, reason and experience teach that this operation is much more liable to be followed with iritis, than the common operation, since in fact the iris is much more fatigued than in the other mode of operating: 7th, that keratonixis is sometimes followed by an opaque cicatrix, which either constitutes simply a deformity, or at the same time a deformity and an obstacle to sight: 8th, finally, that the result of the operation for cataract performed by keratonixis, does not sensibly differ from the results of the operation by puncture of the sclerotica. In fact, the following have been the results of twenty-one operations of this kind performed by Dupuytren, on individuals of different sexes and temperaments, presenting cataracts with various combinations, and such as are commonly found in individuals taken at random. Of twenty-one operations to which Dr. Marx was requested by M. Dupuytren to attend, eleven have been immediately and permanently successful, six have terminated successfully at the end of a month: in two, nervous symptoms supervened: five have been affected with slight ophthalmias: in two, an inflammation of the iris appeared: in one, an inflammation and atrophy of the eye ensued: in five, the remains of the crystalline membrane have adhered to the circumference of the pupil: in four, a second and even a third operation have been performed. One patient lost his eye from inflammation, in another the faculty of sight has been obstructed by the formation of an opaque cicatrix before the pupil: finally, two others have been affected with an amaurosis independent of the operation and of its consequences, which has prevented the cure.

The nervous symptoms disappeared after a few days, by using some antispasmodics in combination with alteratives, and the simple ophthalmias have yielded after ten or twelve days to the use of antiphlogistics: one of the cases of iritis was cured by antiphlogistics and alteratives, purgatives and pul-

verized belladonna ; while the other was cured by an operation, which removed the membranous pellicle which generally forms in this case behind the iris, and to which the edge of the contracted pupil commonly seems to adhere.

In conclusion, seventeen individuals out of twenty-one, recovered their sight, that is, four-fifths, plus one, of the patients operated on. This result does not differ sensibly from that obtained by M. Dupuytren, by puncturing the sclerotica. The professor, however, does not conclude from this that keratonixis should be renounced ; but on the contrary, that it must be considered as a new resource, preferable in certain cases to the common mode of depression ; that the number of these cases appears to him very limited, and he has hitherto found none in favor of this operation, except a prominence of the orbit, narrowness of the opening of the eyelids, smallness and depression of the eye, excessive mobility of this organ, and especially the convulsive movements which agitate it in some individuals, particularly in children affected with congenital cataract, and in persons affected with cataracts of the centre of the crystalline membrane. In these cases, keratonixis is preferable, not only to depression by puncturing the sclerotica, but also, and much more, to the operation by extraction.

We have now to recapitulate briefly the general principles professed by M. Dupuytren on the course to be pursued, before, during, and after, the operation, whatever may be the method proposed to be employed. Before the operation, the professor thinks it highly important never to perform it without carefully studying the state of the atmosphere, the influence of temperature, and the prevailing medical affections. Every one knows that at times, ophthalmias are extremely common, and it is very probable the operation would then be followed by inflammatory symptoms. He also examines very carefully the general state of the patient, and the nature of the affections concomitant with the cataract. These affections, which often contraindicate or delay the operation are, either a rheumatism

more or less recent, a pulmonary catarrh, an affection of the stomach, intestines, &c. Constipation, hemorrhoids, herpes, and cerebral affections may affect, more or less indirectly, an eye already irritated by the operation. If a rheumatic affection exists, the operation may cause a determination of it to the head : the eye and its appendages become painful ; and a severe ophthalmia frequently shows itself. It matters little whether this effect be produced by rheumatism, or by irritation, it is never prudent to operate in these cases, and experience has shown the bad symptoms which follow. We must then, treat the rheumatism with remedies, and if we decide to operate while any wandering pains exist, a blister must be applied to some part remote from the head. If a pulmonary catarrh exists, besides the determination of blood to the head from coughing, there is some fear, if the cataract be depressed, that it will reascend by the motions of the head produced by the cough. If the stomach be affected, we shall not only have the same mechanical symptoms as are determined by the cough, and which may be caused by vomiting, but likewise all the complications necessarily resulting from the sympathy between the stomach and eyes : we know in fact that some affections of the eye are the immediate effects of lesion of the stomach. Further, if an operation be performed during the existence of a disease of the stomach, although this affection be slight, a diet must be observed for a longer period, and we all know the difficulty of subjecting children and old people to it : in these latter, also, the diet is not always without danger. In some patients, it produces a nauseous, sour odor—it occasions a bad taste, a bad mouth ; the tongue becomes broad, pale, coated, and this state is not easily removed. Patients are sometimes affected with diarrhea, and are obliged to rise frequently ; hence displacement of the cataract. Constipation may cause several inconveniences of the cough, and produce sympathetic affections, when it arises from irritation. The co-existence of bleeding hemorrhoids contraindicates the ope-

ration : and although it may be performed when the discharge has ceased, we must in this case always guard against a congestion of blood in the head, and combat the least symptoms of it, by applying leeches to the anus. When the patient is affected with herpes, the operation may cause a repulsion of the irritation, which would certainly occasion some disease of the eye difficult to be cured. Hence, M. Dupuytren does not decide upon the operation, till all symptoms co-existing with cataract (many of which we have omitted) have been treated.

Even when there is no complication, the patient, before submitting to the operation, is prepared for it, by means which M. Dupuytren never neglects, and which perhaps are as important as skill in the surgeon. These precautions, or the preparatory treatment, consists in prescribing baths, emollient injections and drinks, general or local bleedings, according to circumstances and to the constitution of the patient : occasionally he prescribes some spoons-full of castor-oil, and finally if the eye be very movable, if we fear that this organ will be irritated at the approach of instruments, it is habituated previously to surgical manœuvres, pretending to perform the operation, and showing the motions of every kind, which it must hereafter support. When M. Dupuytren intends to perform the operation by keratonixiè, he is careful to drop in the morning between the eyelids some drops of a solution of extract of belladonna or wild cherry water, in order to dilate the pupil.

The patient being properly prepared, by the means mentioned, the operation is performed, and depression is the mode generally adopted by M. Dupuytren, as we have already mentioned. In order to perform this operation the patient is always left in bed, and placed in the horizontal position, the head raised : this position is less favorable for extraction, but on the contrary in the operation by depression, has the advantage of keeping the eye and the patient perfectly motionless ; and also the crystalline lens is not likely to reascend by the motions and changes in the position of the patient. The professor is satis-

fied, contrary to the opinion of many practitioners, that the selection of the horizontal position is essential to its success.

There is one disagreeable symptom, which may happen when the patient is operated upon in a chair, and which Dupuytren has had occasion to remark, viz., *syncope*. This event, while performing an operation as delicate as that of cataract, is very perplexing to the surgeon. In 1830, M. Dupuytren was requested by Dr. Husson, to visit a patient who had been operated upon for cataract, a long time since, and one of whose eyes was diseased.

The operation by extraction, had been performed on one eye. The patient was placed on a chair, and the surgeon had hardly finished the section of the transparent cornea, when so violent a syncope supervened, that the operation could not be completed. The crystalline lens remained in place; the wound healed, and some months after, the other eye was operated upon by the same surgeon, and in the same manner. He was placed as before on a chair: syncope ensued, some time elapsed and much difficulty occurred before the operation was concluded. This very embarrassing symptom probably would not have happened or would not have continued so long, had the patient been in bed.

The operation concluded, M. Dupuytren covers the eyes with a bandage, and takes the necessary precautions to prevent the light from affecting the patient, and prescribes diet and absolute rest. His conduct in regard to diet is governed by the age of the individual, and other circumstances. If the patient have a strong constitution, if any tendency to congestion in the head exist, he bleeds during the day, and even again at evening if there be pain in the head or eyes. At the same time a calming potion, pediluvia, and glysters are administered. If vomiting supervenes, and this phenomenon generally appears in children, he prescribes first an anodyne potion, composed of lettuce water, orange-flowers, syrup of poppies, and if they continue, of Selzer water or Riviere's potion.

In cases where agitation and nervous symptoms exist, glysters with a few drops of laudanum in them produce very good effects. General bleeding, leeches particularly to the anus or the lower extremities, pediluvia, antispasmodics, diluents, purgatives, external revulsives, vesicatories, setons in the neck, these are the principal means with which M. Dupuytren meets the symptoms, and on which he insists more or less, according to the character or the continuance of the latter.

Contrary to the practice of many celebrated surgeons, when the patient is affected with a double cataract, M. Dupuytren operates upon one eye first, and always waits before proceeding to operate upon the other, until the fate of the first is determined, and the cure is perfect. Experience has proved to him the advantages of this course, which reason and the knowledge of the laws of physiology also justify. In fact, two operations at the same time, must necessarily be more serious to the patient than one; and the inflammation which results from it, affecting two important organs which are peculiarly sensitive, will produce more intense effects, and symptoms which are less easily treated. But it is particularly worthy of attention, that this inflammation rarely presents the same regularity in both eyes: it almost always centres itself with violence in one of them and there produces rapidly a complete disorganization, while the other is but slightly affected. We observe here that which generally occurs in simultaneous inflammation of a pair of organs.

Let us now state the treatment pursued by M. Dupuytren in different complications of cataract, the study of which is more necessary, as they increase more or less the difficulties of the operation. One of the principle and most common is, the contraction of the pupil: several instances of this have occurred at Hotel Dieu, and sometimes to such an extent, that the opening in the pupil would not even afford passage for the cataract needle. This contraction, which depends on no organic cause, and which may therefore be termed inorganic, is frequently seen in

scrofulous individuals ; it depends on an inflammation of the retina and may be recognized by its thickening and redness. This inflammation when attacked in time, yields to antiphlogistics and to dropping in some drops of the watery solution of extract of belladonna. Another complication is the adhesion of the crystalline capsule to the posterior face of the iris, or of the crystalline lens to the membrane surrounding it, or of the iris to the ciliary body : finally, the displacement of the crystalline lens, &c.

In general, says M. Dupuytren, nearly all the diseases which affect the crystalline membrane, the iris, the pupil, the ciliary body, or the other parts of the eye affected in cataract, result from an inflammation of the iris, an inflammation which is extremely frequent, and the consequences of which are more or less dangerous to the sight. These diseases, we say, are generally the effect of iritis, and many reasons tend to confirm this opinion. If we examine the adhesions between the crystalline capsule and the iris, we see clearly that the vessels which are there infinitely developed, arise principally from this latter, and it is generally known that in the formation of adhesions, when two surfaces are thus united, that most of the vessels come from that which is most active, that is, from the most inflamed surface. It is then very probable that in this case the crystalline capsule is consecutively affected. Farther, if we call to mind that three-tenths of membranous cataracts arise either from contusions or from external injuries to the globe of the eye, or rather from a particular scrofulous affection of the organ, our opinion becomes still more probable. Finally, if we observe attentively the anatomical structure of the eye and particularly the arrangement of the vessels distributed to its different parts : if we remark that the plexus of vessels is situated not on the outside, but on the inner side of the conjunctiva ; that the inosculations of the small vessels are very numerous, form a kind of zone at the junction of the sclerotica with the transparent cornea, and disappear in this part in proportion as they penetrate into the sclerotica to go to the iris, we can explain how

an ophthalmia which was seated primitively in the conjunctiva, may ultimately extend to the iris and produce symptoms which we have mentioned. The remarks on alterations of the crystalline capsule will apply to other morbid affections of the eye. A slight inflammation of the iris is sufficient to produce two remarkable phenomena: the contraction of the pupil and the deposit of a small quantity of lymph on its anterior part, filling the space between it and the crystalline membrane; this quantity may increase until the effused lymph passes through the pupil and is suspended at the base of the anterior chamber. Then if the progress of the disease be not prevented, the same thing takes place as in all cases of effusion of the same nature, that is, a false membrane forms, and adhesions occur between the different tissues; or the pupil is entirely obliterated, which however is very rare; or the iris adheres to the crystalline capsule

But when we speak of iritis, and of contraction of the pupil, it is important that we should be understood correctly. It frequently happens that idiopathic inflammation of the iris is thought to exist, when it is only in a sympathetic state, depending on an inflammation of the retina. The last inflammation is very common, and much more frequent than is admitted. Hardly a week passes, but some instances of it occur, either in our wards or at consultation. They are particularly common in scrofulous subjects. When these children are brought to our amphitheatre, we can judge of the nature of the disease as far as we can see them: they advance with unsteady steps, their hands before their eyes as if to protect them from the light, and when they come before the window, they turn quickly aside and put their hands over their eyes; if told to remove their hands, they apply them still more strongly; if we attempt to remove them, they resist; if we try to open the eyelids, they try to prevent it: finally, when this is attained, they cry loudly, keep the eye turned convulsively upward, and the transparent cornea concealed under the upper eyelid; in

fact, they dread the light. But whence is this fear of the light? Why is the least ray of light so painful? Certainly not on account of an injury to those tissues of the eye which are completely insensible. Is it an inflammation of the iris? But this inflammation often exists to a very great degree without this symptom. We must then necessarily admit that it depends on an inflammation of the retina, of this nervous membrane which is extremely sensible, and which receives and transmits the impressions of the light. Irritation of this organ re-acts on the iris, and produces a contraction of the pupil, which is so often considered as we have before stated, as a characteristic of iritis. We conceive that all the difference between these two cases, is that in one, the contraction of the pupil is the consecutive effect of inflammation of the retina, and in the other, the immediate effect of an idiopathic affection of the iris. The distinction between them is that great dread of the light which we have mentioned.

One complication of cataract, of which we have yet to speak, and which renders the operation completely nugatory, is a paralysis of the retina. It is highly important to ascertain this injury at first, in order not to attempt a useless operation, and expose the patient to accidents which may result from it. When other diseases are absent, (as the adhesion of the crystalline capsule to the posterior face of the iris,) to which the immobility of the pupil may be attributed, this last symptom is generally the most certain. But in some individuals we meet with some peculiarities which establish, if not an absolute certainty, at least a very strong presumption of the existence of this paralysis.

A young man, twenty-eight or thirty years old, now at Hotel Dieu, is affected with an accidental membranous cataract, which was produced by an accident, a contusion received on the anterior part of the globe of the eye. The crystalline capsule is not totally altered; several points of its surface, and the crystalline lens are perfectly transparent: vision, however,

is completely lost, the patient being unable to distinguish day from night. An aged lady, upon whom M. Dupuytren operated the 16th of December, presents an instance of the contrary. Although the lens was entirely opaque, the faculty of seeing still existed to a slight extent, and the patient could distinguish night from day. Whence arises this singular difference? What is it in the young man which prevents all perception of the rays of light? Any of you would conclude that more than a simple cataract exists here; and in fact we have strong reasons for thinking that the cause of this phenomenon depends on a paralysis of the retina. We have now but little hope of restoring sight. The patient, however, requests the operation, although his sight may not be restored. The desire of being freed from a deformity is doubtless the reason of his request. I have often known persons, especially females, request the operation in similar circumstances, without hope of recovering their sight, with the sole intention of being freed of a deformity which disfigured them. In one, the performance of a marriage contract even depended on it. I have sometimes yielded to these considerations, and no bad symptom has followed. These reasons, however, are too trivial in a man, who can live with a cataracted eye without inconvenience; we shall, therefore, persuade our patient not to persist in his requests, if we think the operation will be unsuccessful in restoring vision.

However skilfully the cataract may be depressed, it frequently happens, and it is one of the most serious objections to this method, that the crystalline lens re-ascends, and re-assuming its place behind the pupil, prevents the light from penetrating to the retina. Efforts of coughing, careless motions of the patient, and a great many other causes, may produce this result. It is difficult to express the grief of the patients, who recover their sight for a moment, and again lose it.

If the cataract has been depressed in a mass, there are two courses to pursue. It may be left in place, until it shall be

re-absorbed : but this sometimes requires so much time that it is better, generally, to depress it again, which must be done as before.

There are cases where the cataract tends so much to re-ascend, that M. Dupuytren has been obliged to depress it four times in as many months. He has remarked that the danger of the operation is diminished, the more frequent its repetition in the same individual.

In these cases, the crystalline lens is generally soft and downy on its surface, a proof of the action exercised upon it by the absorbent vessels : a patient recently operated upon at Hotel Dieu has offered an instance of this.

Sometimes, too, when the crystalline lens has been depressed once entire, a part of it has re-ascended, when the other part has been absorbed, or has been detached from it spontaneously, or remains in the vitreous body. An old man, upon whom M. Dupuytren operated a second time, for an occurrence of this kind, presents an instance of this peculiarity.

Cataract can re-appear behind the pupil even when it has been broken up or divided : in this case, it is formed by the union of more or less numerous parts of the divided cataract, which rise and blend together behind the pupil. The absorption of cataracts of this kind, which may be called *agglomerate cataracts*, is generally more easy and rapid than that of entire cataracts. Then after a greater or less length of time, depending on the age and the absorbent powers of the patients, transparent spaces appear and extend until the pupil is entirely clear. The sight of the patients is restored, extends and becomes stronger in the same proportion, and every day they make discoveries which cause as much joy as the attack of the disease had caused sadness. Sometimes, however, the remnants of these cataracts obstinately remain, and affect the sight in a greater or less extent. They must then be operated on, torn and turned from the axis of the rays of vision.

The functions of the crystalline lens, continued M. Du-

puytren, are well known ; if it be removed, depressed or destroyed, vision cannot take place as in the natural state. Some short-sighted individuals recover their natural sight from the removal of the lens ; but those who are far-sighted have more trouble in seeing than before the formation of the cataract. The latter require a lens to supply the crystalline lens : but the use of these glasses should not be permitted until long after the operation has been performed ; otherwise the intensity of the impression they cause, would inflame the eye, and the patient might lose the benefit of the operation, as we have often remarked.

The crystalline lens, which is retained in its capsule firmly in the healthy state, seems more susceptible of displacement when its transparency is lost. Sometimes it is entirely displaced, and passes into the anterior or posterior chamber, more rarely into the former : sometimes it remains partly fixed, but is detached in a greater or less extent, and floating by one of its sides, completely obstructs the opening of the pupil. It is from similar displacements, that patients with cataracts have suddenly recovered their sight after a quick motion, or a blow on the head or eye. Sometimes the lens passes into the vitreous body while we are attempting to extract it, or passes into the anterior chamber during depression. Finally, some cases prove the power possessed by some individuals, of making the opaque crystalline lens pass at pleasure from one chamber of the eye to the other. The most remarkable case of the kind, is certainly that mentioned by Demuros in his treatise on diseases of the eye : "I have sometimes seen the opaque crystalline lens pass through the pupil into the anterior chamber, and thence return into its place. Some patients can execute at pleasure this alternate displacement. Dr. Tillard and Surgeon Busnel were with me, July 3d, 1817, where we saw M. Gastel, who was affected with cataract, cause the opaque lens to pass into the anterior chamber, and again behind the iris. M. Gastel is a shoe-maker, thirty-one years old,

and is of good constitution. The cataract in his right eye commenced when he was six years old: the opaque crystalline lens gradually descended behind the iris, about the period of puberty. It was invisible when he was eighteen years old, and passed into the disorganized vitreous humor. When nineteen years of age, while actively engaged in military service, this body passed before the iris. The continual pain of the patient obliged him to obtain his discharge. I proposed to extract it, but the patient desiring to avoid the operation, I advised him to drop into the eye a little of a watery solution of the extract of belladonna, to dilate the pupil, and facilitate the return of the opaque lens behind the iris; to favor this return, by reclining for twenty-four hours on his back, and even during this time, to lean the head occasionally towards the floor, so that the vertex should be lower than the neck: finally, to drop in a few drops of vinegar as soon as the lens had disappeared, in order to excite an artificial inflammation, capable of causing the dilatation of the pupil to cease, and even of rendering its diameter smaller than before he used the belladonna: a process which I have found useful in certain cases. This was done, and followed with the success I expected.

For eight and a half years, M. Gastel was not incommoded with this singular accident, which has occurred again for two years, three or four times a month. If he bends the head quickly and carelessly, the lens passes before the iris: he then suffers, and is incapable of occupation, until laying on the ground, the chin raised and the vertex downward, he causes it to re-enter by strongly rubbing the globe of the eye with the upper eyelid. I shall probably extract it some day."

One perceives, said M. Dupuytren, that all these varieties in the disease require certain modifications in the manual of operating, or in the treatment, according to their causes and their nature. If contraction of the pupil be produced by acute inflammation, antiphlogistics, leeches to the angle of the eye, scarificators to the temples, and especially bleeding in the feet

will remove it : but if the affection be chronic, if there be no sign of inflammation, the above mentioned remedies will have no advantageous result : we must then use frictions with the extract of belladonna, and especially with the wild cherry water, in order to dilate the pupil properly, and to facilitate the operation.

Observation has taught me that cataracts attended with a considerable contraction of the pupil, are frequently complicated with the adhesion of the crystalline capsule to the posterior face of the iris. In these kinds of adhesion, if the case appears when the effused lymph begins only to condense, and gives rise simply to an agglutination, which is easily destroyed, the belladonna may still be very useful ; for the iris, in extending suddenly by the action of the application, destroys by this motion a great part of this recent agglutination, and but little remains for the operator to do. If the adhesions are organized, it is necessary to carry the needle to the cataract between the two membranes, and to destroy their union before depressing the lens. The adhesion of the iris to the ciliary body varies much in different individuals : in some it is so extensive and so intimate, that it is very difficult to separate them, when we wish to produce an artificial pupil : in others the iris tears before it can be separated : finally, in others it is detached by the least effort.

In displacements of the lens, whether opaque or not, M. Dupuytren admits as a general rule, that whatever may be its position, when it causes no inflammation, it must be left to itself, but the operation must be performed as soon as the least inflammation appears. In fact, if it be not opaque, we gain nothing by extraction, and in the contrary case, nature is entrusted with its depression. When the crystalline lens is depressed in the vitreous body, there is evidently nothing to be done except to leave it in the position it occupies ; for the case is similar to that resulting from the operation by depression, and the lens is submitted to the action of the absorbent ves-

sels. When it is in the anterior chamber of the eye, the operation is simple and easy. In most cases, a small incision is made in the cornea, and the foreign body falls of itself, or it is extracted with a needle. This is the usual mode.

M. Dupuytren was the first who varied from the common manner of operating in a case of this kind, in 1819, in a new mode. A soldier, thirty-four years old, entered Hotel Dieu November 2d: the anterior chamber of his left eye was completely filled by a rounded body, of a pearly white color, and formed by an opaque lens, which had escaped spontaneously from the pupil, apparently at the time when the patient forcibly bent his head. The eye was red, painful, inflamed and watery, and there was intense head-ache. Venesection, a bath and a purgative arrested these symptoms, and M. Dupuytren performed the operation two days afterward as follows.

The patient laid in bed, the head raised by pillows; the needle was introduced about two lines from the union of the transparent cornea with the opaque cornea: the operator passed it through the posterior chamber, penetrated into the anterior, hooked the crystalline lens, brought it into the posterior chamber, at the base of which he held it depressed for some time; he then withdrew his needle. The patient saw the hand which restored sight to him, and distinguished the persons who assisted at the operation. The sequel of this case was fortunate. The patient left the hospital six days after, the pupil perfectly clear, seeing very well, and not feeling the least pain. M. Dupuytren's operation in this case, was to introduce the needle through the sclerotica, into the posterior chamber, proceed into the anterior, fix the crystalline lens, bring it into the posterior chamber, and then depress it into the vitreous body. We shall mention the professor's opinion on the value of this mode of operating, hitherto unknown, and adopted for a special case, when he has an opportunity of stating it.

We have mentioned the principal ideas of M. Dupuytren on cataract. We shall hereafter refer to cases to support these generalities.

ARTICLE V.

OF ENGORGEMENT OF THE TESTICLES.

Inflammatory, Scrofulous and Venereal Engorgements.

THE art of the surgeon consists not only in removing dead parts, but also in preserving those which the unscientific practitioner would not hesitate to amputate. How many miserable beings have returned from the field of battle more injured by improper surgical treatment than by the shot of the enemy. We could mention a great number of hospitals, where a mania for operating has cost many a patient his life. How many surgeons, for instance, amputate a limb affected with white swelling, without inquiring whether the lungs are affected with tubercles, or other diseases? This rage for operations has never appeared to us more manifest, than in cases of engorgements of the testicles. One ought, however, to remark, that grief, chagrin and melancholy, finally destroy those who have been thus cruelly mutilated. This deplorable result has not escaped the notice of M. Dupuytren: hence he has been able, for several years, to prevent the operation in a great many cases, by pursuing a course of treatment decided upon after referring to the origin of the disease.

About one hundred individuals are received annually, at

Hotel Dieu who are affected with engorgement of the testicles. Most of them are cured without submitting to an operation.

There are now several patients in the ward St. Martha. In some, the engorgement is situated in the epididymis, in others, the body of the testicle is affected; finally, in others, the body and the epididymis are both diseased. In three of these cases, the engorgement has supervened after a blenorrhagia, and in two it has appeared although no discharge existed previously.

About two months since, one of these individuals, aged forty years, came to the consultation to ask advice in respect to a tumor in the right testicle. The organ was six times its usual size. On touching it, an induration was observed, which is not felt in hydrocele, while upon its surface, prominences and inequalities were readily felt, which are almost a characteristic sign of the existence of schirrous. The weight of the testicle was considerable. Questioned as to the cause of the disease, the man answered that he attributed it to a bruise of the organ. In most cases, says M. Dupuytren, I have discovered that engorgement of the testicles proceed from external injuries, from old venereal diseases, from a scrofulous habit, or from an internal affection: and therefore it is my rule never to extirpate the testicle before employing for a month or six weeks, the treatment which I think proper.

The first explanations given by the patient, led M. Dupuytren to suspect that the engorgement was caused by an external injury: he therefore thought that the antiphlogistic treatment would resolve the tumor. The patient's constitution would not lead one to suspect a scrofulous habit: he therefore recommended to apply leeches to the tumor, and to cover it with emollient cataplasms, to bathe, and to pay strict attention to regimen. This individual returned to the consultation having derived no benefit from this treatment. He was ordered to employ the same means a second time, but in vain. He was admitted into the hospital and examined again: his partial

avowals lead to the suspicion of old syphilitic affections: the professor therefore prescribed the antivenereal treatment which he has employed successfully for a number of years. The patient was put upon the use of a decoction of smilax sarsaparilla, smilax chinensis, and guaiacum, (two glasses,) with from four to six ounces of sudorific syrup: three times a day he took one of the following pills:

R Deuto chlorid. hydrarg. from $\frac{1}{8}$ to $\frac{1}{2}$ gr.

Op*i*i grs. ss.

Ext. Guia*c*. grs. ij.

M. Dupuytren having learned from experience that fractional doses act more efficaciously than those which are more powerful, prescribes these pills, each of which contains one eighth or one sixteenth of a grain of corrosive sublimate, to be taken every day, so that the patient gradually takes the full dose, which is half a grain. After one or two months, the symptoms are generally removed by this treatment: but notwithstanding the patient's perseverance in this course, he derived no benefit from it. On the contrary, the testicle had enlarged: it was heavy and uneven; the individual experienced lancinating pains, which extended along the spermatic cord to the kidneys. In this situation, M. Dupuytren thought it would be dangerous to defer the operation any longer. "I think I shall not be mistaken," said he, "in stating beforehand that the vaginal tunic contains a quantity of effused liquid: but this symptomatic hydrocele is not the disease: the principal affection is the engorgement of the testicle in consequence of an alteration in its substance; probably the alteration has not extended far; for if we may believe the statement of the patient, the engorgement has existed only three months. If it had continued a year, I should not hesitate to say that we should find the testicle soft and grayish, and, in short, presenting the characters of a cerebriiform cancer. But how must this organ be removed? the answer is easy: By as speedy and as safe a process as possible. We must make an incision upon the

anterior and posterior parts, commencing as high as the inguinal ring and going to the lower part, and rising posteriorly. Our reasons for this incision are, the testicle is not the only part diseased, but the affection frequently extends to a part of the spermatic vessels; hence the incision is carried to the inguinal ring to follow the diseased parts; it extends the whole length of the organ to remove it entirely from its envelopes; for if the opening were only two or three inches long, the testicle could not easily be brought outward, and the dissection would be extremely painful. The purpose of the incision posteriorly is also easily understood: if it were not made in this direction, the bursæ would contract and form sacs in which pus would accumulate. The incision finished, we must immediately attend to tying the vessels, as they may ascend from spasm and the action of the air, and then we should run some risk of hemorrhage, if from the action of moisture and heat, they should relax. After this period of the operation, the testicle is brought out, seized, and the bursæ are held by two assistants: the spermatic cord is dissected; the open vessels are tied, if there are any, because the effusion of blood may cause infiltration, inflammation and abscesses, and we may be obliged, as a final resource, to apply ligatures. We must be careful to remove all the cellular tissue surrounding the testicle, the cord, the membranes, and even the cremaster muscle. The cord is examined; if healthy, it is divided above the testicle; if diseased, the incision should extend far beyond the diseased part. Different processes are employed for extirpating the testicles in animals. Some twist the cord of the spermatic vessels and tear it, others distend it, and remove it without twisting. We can easily see that this operation is very painful by the position assumed by the animal. Tearing the vessels is not followed by hemorrhage; but this advantage does not seem to us to counterbalance the severe symptoms to which it may expose man. In Normandy, the testicles of horses are removed by compressing them between two sticks, when the

parts are separated by gangrene. This dangerous mode destroys a great number of these animals.

In man, the testicles are removed in two modes. A simple division might occasion hemorrhage, and further, the parts have by no means so much retractile force as in animals. We must then, said M. Dupuytren, embrace the cord in a general ligature. This ligature will include the vas deferens, the cremaster muscle, and the vessels. It will also comprehend the nerves of the testicles, the spermatic vessels and cord. But this method is itself very painful, and it would be better to make partial ligatures. If the cord be divided before ligatures are applied, these ligatures are applied more easily. We must be careful not to divide the cord too near the inguinal ring, in order not to expose to internal hemorrhage. To oppose the retraction of the cord, we commonly have recourse to a general ligature, but this is painful ; it is more simple to fix the spermatic cord by passing a tenaculum through it. It is then divided below this instrument. This division completed, the surface is sponged off to see whence the blood comes, and separate ligatures are applied. If the operation has been short and simple, and the ligatures properly placed, the lips of the wound may be united by the first intention. But the tissue of the bursæ is retractile and extensile ; in consequence of these properties, the lips of the wound separate and turn inward, and the skin alone is in contact. This arrangement is also a great obstacle to the cicatrization : in order to prevent the approximation of the skin, M. Dupuytren employs two or three stitches. This dressing has the advantage of hastening the cure, and of preventing the effects of hemorrhage.

Extirpations of the testicles are very rare at Hotel Dieu, while they are very common in other hospitals ; we have mentioned the reasons above. We will add that the treatment at Hotel Dieu does not prevent the operation from being performed at a later period : hence the important precept not to extirpate a testicle reputed cancerous, until perfectly satisfied

that the disease does not depend on an inflammation from some external cause, on a scrofulous or syphilitic affection, or on an internal disease. Without this indispensable precaution, after a greater or less length of time, we might see the engorgement of the second testicle. The following case is a striking instance of this.

M****, 40 years old, a farmer, was for two years diseased with an engorgement of the left testicle. This patient, formerly a soldier, had been affected with some venereal taint. However, the size, hardness, and lancinating pains of the testicle left no doubt as to the nature of the engorgement: it was considered as schirrous: its removal was proposed and the operation was performed by Dr. C****. The cord and inguinal glands were healthy, the wound healed rapidly, but in a month the right testicle began to enlarge. Was this a return of the disease? According to this, would it be proper to amputate this organ also? Would there not be danger of its extending into the belly? The case was very embarrassing, and M. Dupuytren was consulted. His experience and his habit of interrogating his patients with care, and of subjecting them to a treatment proper for the presumed cause of the engorgement before performing the operation, led him to prescribe the antivenereal treatment. A month afterward and the engorgement diminished in size, and was soon completely resolved.

Let us mention another fact of a different nature, but which proves how reserved the surgeon should be in his diagnosis.

In 1827, a man entered at Hotel Dieu, who was affected with a considerable engorgement of the left testicle. Lancinating pains were felt in the tumor and extended along the spermatic cords to the groin and to the kidneys: the patient was very thin. There was no symptom that the disease was owing to a hydrocele, or to a scrofulous or venereal engorgement; there was every reason to think it was schirrous. M. Dupuytren nevertheless observed that if the hydrocele was complicated with a cartilaginous thickening of the vaginal

tunic, we might be mistaken, and that this mistake had been committed more than once. To prevent this error, added the professor, a longitudinal puncture will be made in the skin, and after laying bare the testicle, the vaginal tunic will be punctured, near the centre of the tumor: if no liquid runs from it, or if a little decomposed and fetid blood only escapes, the cord of the spermatic vessels should be seized, and tied in a mass; it should be entirely divided, and then the vessels should be tied. In this manner we shall avoid all exposure. If, notwithstanding all these appearances, the pouch is filled with water, we shall operate soon. The operation proved the prudent conduct of this enlightened practitioner, for instead of a schirrous tumor, there was only a hydrocele with a cartilaginous thickening of the vaginal tunic.

In engorgements of an inflammatory nature, the disease sometimes affects the body and sometimes the epididymis, or both: in the first case, the swelling is more distinct and more easily resolved: that of the epididymis, on the contrary, is smaller, harder, and more difficult to be cured. The anatomical structure of the parts explains this difference. In fact, the testicle, is an organ formed of a soft, pulpy, parenchymatous tissue, and in this, consequently, inflammations appear and disappear rapidly. The structure of the epididymis, on the contrary, is much more complex, and presents internally a mucous surface and perhaps also a muscular membrane and externally a fibro-cellular tissue; engorgements form in it more slowly and are much more difficult to be treated. In this last class of patients, the anterior part is soft and supple, which leaves no doubt as to the healthy state of the testicles: but in carrying the hand to the posterior part, we feel a hard and uneven body, which very evidently belongs to the epididymis. Leeches, baths, and emollient cataplasms, generally cure inflammatory engorgements of the testicles, while they are much less efficacious in cases of swelling of the epididymis. M. Dupuytren recommends an antiphlogistic treatment; if this be

unsuccessful, he substitutes for it alteratives and diluents. These are the three leading points of his treatment in such cases. Thus in the acute state, the antiphlogistic course will be sufficient to discuss the symptoms. One, two, or three bleedings, according to the strength of the patient; twelve, fifteen, or twenty leeches, repeated several times; baths, emollients and strict diet will remove the disease. These remedies are so powerful, that engorgements have frequently disappeared in eight or ten days. If the engorgement at first view appear primitively chronic, or if it pass from the acute to the chronic state, we must begin by using emollients: we must then employ discutients, as plasters of diachylon, of mercurial soap; but the cure will be very slow, unless the derivative method be used, which consists in the employment of purgatives every two or three days. Calomel, so often abused, is an excellent remedy. If this fails, we may administer castor oil, at 10 or 11 o'clock at night, in doses of one, two, or three table-spoonsful, according to the temperament and strength of the patient. Other purgatives, as the sulphate of soda, seidlitz water, &c., may be given with advantage. This treatment generally resolves engorgement of the testicles, but when not employed perseveringly, these organs become cancerous, and they must be removed.

The cause of engorgement of the testicles, may be a scrofulous habit, and it does not seem difficult at first view to distinguish engorgements of a venereal character, or those caused by bruises, from those which are scrofulous: I, however, must say, added M. Dupuytren, that in many cases they begin exactly in the same manner, and they do not present their real character till sometime after; the latter, however, do not generally yield to the ordinary treatment; they are prolonged indefinitely, and often exist with other affections of the same nature, and are connected with a scrofulous habit.

Tuberculous disease is one of the principal characters of this kind of engorgement: in most cases it affects the fibro-cellular

tissues which encircle the epididymis: it shows itself also in the substance of the testicle. These tubercles are developed slowly, and may continue three or four years: their development, progress, and duration, are circumstances which show their nature. These engorgements are less hard than the schirrous tumors, and harder than those which are inflammatory. They are without heat, without redness, and cause sensations of weight and dulness: the subcutaneous cellular tissue is usually loose. The tumor is commonly uneven and irregular in its general form, while in the schirrous engorgement, the testicle is globular and the epididymis is uneven; the spermatic cord usually escapes, sometimes, however, it is affected. As the disease progresses, soft points form within the organ, and if handled, they feel as if we touched a soft body; small prominences soon appear externally, which correspond to bluish points. These parts of the skin ulcerate, and a serous pus escapes through the openings, a caseous matter, which is soon yellowish and pultaceous: this is evidently produced by a scrofulous affection. Fistulas are found which give vent to a serous and badly formed pus. At this period there can be no doubt respecting the disease. This affection may continue for years. If, at the commencement, the disease is treated and arrested, the organ soon presents a better appearance; but if the disease be not arrested by medicine, the testicle becomes soft, fungous, and similar to the tissue found around joints affected with white swellings. The scrofulous testicle may pass to the cancerous state, but this termination is rare. When at this degree of disorganization, the disease if confined to this organ, can be cured only by extirpation.

When the engorgement is recognized to be of a scrofulous character, if symptoms of inflammation exist, they must be treated by remedies, and when they are discussed, we must improve the general health, which is often of more advantage than remedial treatment. The patient must select a dry and

elevated spot of ground for his habitation, which should face the south. He should wear flannel from head to foot. Dry frictions should be used over the body. He must exercise in the open air, and as much as possible in the sun. He must use a tonic regimen, must live on dark meats, game, antiscorbutic vegetables, as cresses, celery, cardons, and radishes. He must guard against vegetable and mineral acids, and acid and farinaceous vegetables. He must drink ptisans made of an infusion of wild cherry and the tops of hop leaves. If his constitution is decidedly lymphatic we recommend a watery syrup of gentian, carefully forbidding that made with wine or with ammonia.

Other remedies also may be administered. Lately we have used iodine and its preparations. It is given in doses of one eighth, one sixteenth, one fourth, or one half a grain in distilled water made aromatic with mint. The virtues of iodine, like those of all new medicines, have been singularly exaggerated; it is a medicine which has succeeded in many cases, but it would be wrong to consider it a panacea. It has been used externally in combination with potash (the hydriodate of potash) in ointment or in lotions. When we do not wish to employ this remedy, we may employ sulfurous, salt, aromatic and stimulant baths. These same liquids may be applied to the affected parts. It will be useful to inject them into the fistulous passage, being careful that these liquids be confined in them. But it will be better to employ upon the affected parts, sulfurous, saline, and ioduretted douches. By persevering a long time in this course, and by the aid of the cautery, we shall often remove scrofulous engorgements.

But, if after using these remedial modes, the testicle is very much diseased, if it tends to schirrous, if it becomes soft and pulpy, and contains many scrofulous abscesses, we must not hesitate about extirpating it, but in that case, we must treat the predisposition internally. Without this precaution, the patient would be exposed to consecutive symptoms, to pleurisy,

pneumonia, suppurations of the liver, &c. When the operation has been performed, if we examine the changes in the organ (without any complication of cancerous formation,) we shall find the diseased parts are separated from the healthy portions; here and there are numerous scrofulous appearances, and a whitish, semifibrous, semicellular matter, containing coagulated albumen. We also distinguish tubercles or masses of tuberculous matter, enclosed in mucous cysts, or without these cysts. These alterations generally occur in the cellular tissue surrounding the epididymis, in the epididymis, sometimes in the testicle, more rarely in the cord.

Besides the two kinds of engorgement mentioned, there is a third, venereal engorgements. It has latterly been proposed, said M. Dupuytren, to treat venereal affections exclusively by the antiphlogistic mode: but it has not been considered that in these diseases there are two things to be regarded, the inflammatory and the syphilitic element. The first symptoms of venereal disease are certainly of an inflammatory character, and must consequently be treated by the antiphlogistic method. Sometimes this method removes the symptoms entirely, but if we imagine that a radical cure is accomplished, we should be mistaken. Inasmuch as the syphilitic element had not been destroyed, a relapse may be expected. I might adduce, added the professor, a number of instances to prove that persons affected with venereal disease, and who have not employed the proper treatment, have had ulcerations in the throat, exostoses, engorgement of the testicles, &c., which have been cured by antivenereal remedies. All of you remember the history of those three young students who inoculated themselves a few years since with pus from a venereal ulcer. By an antiphlogistic treatment, all the symptoms were entirely removed. But after a little time the secondary venereal symptoms appeared with so much violence, that one of them destroyed himself; the others consulted me, I treated them with antivenereal remedies, and they were cured. What are

the symptoms of venereal engorgement? Every day we see patients with an engorgement of the testicles, for which no cause can be assigned. They have experienced no injury, and have met with no accident; the engorgement is restored and passes to the opposite testicle, or continues in one or the other. If the tumour be elongated, if its form be cylindrical, if no lancinating pains are felt when it is touched, and if the patient has had old venereal affections, as blennorrhagia, buboes, chancres, which have been treated by cauterization, the most fatal method; if he states that the testicle, after being affected six months, a year or eighteen months, has become normal, while the other organ is affected, there are strong presumptions that the disease is venereal; for if the engorgement were schirrous, it would not be removed in that manner; it is even a pathognomonic character of these kinds of tumors. When there is a relapse, and a cancerous testicle has been removed, the cord generally becomes diseased, while in syphilitic engorgement, the second testicle is affected. If on general examination, you discover the existence of other symptoms, as pustules, exostoses, &c., you can have no doubt as to the case. Whenever you can form no certain conclusion, it would be better to employ the antivenereal treatment for six or eight weeks, than to perform an operation which is entirely useless, and fatal in its results.

The existence of venereal virus has been doubted latterly as we have already said: but experience would seem to have demonstrated it incontestably, and this belief, which is so generally established, has been shaken by subtle reasoning. Admitting this syphilis to be an inflammation, how is it that it is communicated in so many cases? Is not this a characteristic sign in which it differs from other inflammations? The distinction of the two principles of the disease, said M. Dupuytren, being essentially practical, we can easily understand why so many persons who have been treated by the antiphlogistic method have been affected with all the symp-

toms of a constitutional syphilitic disease, six months, a year, or even longer, after their pretended cure. Is not the history of these three students of medicine, which we have cited above, the most powerful answer to the dangerous doctrine of the non-existence of the venereal virus? The syphilitic principle is then a real, a positive virus, which is communicated like that of small pox. Unfortunate are those who regard it as an inflammatory element; in arresting this, they destroy the effect, but leave the cause.

ARTICLE VI.

TRAUMATIC EMPHYSEMA.

ON the 9th of last December, two individuals entered accidentally at Hotel Dieu, affected with traumatic emphysema with different degrees of severity. This is a fortunate circumstance for pupils, said M. Dupuytren, as it presents to their notice two similar diseases, which from the nature, diversity and violence of the causes which have produced them, must necessarily present different forms and characters. One patient is a water carrier, sixty-eight years old, who was injured by the tongue of a wood-cart, and thrown down. He was placed almost crosswise under the wheel, which passed over the left anterior part of his chest. Although the cart was not loaded, the weight of the wheel was sufficient to produce the following symptoms. This man had cough, oppression, and a frequent and full pulse. A careful examination of the right side of the thorax discovered no lesion: but on the left there was

a sharp pain near the precordial region : this region was very painful on pressure. On feeling of it a cracking was perceived like the noise of ribs fractured, the fragments of which crack during the respiratory motions of the thoracic parietes. This noise might be heard, and we might also perceive a sound similar to that which would result from the fall of numerous drops of water in rapid succession.

There was also on the same side a considerable swelling, but the skin was not discolored, nor was there the least trace of inflammation : this swelling could be displaced and carried from one part to another, by compressing it and following it with the hand. This was not all : when it was pressed in this manner, we felt a distinct crepitation, such as is perceived in animals, where the cellular tissue is inflated, before skinning them. These symptoms are infallible signs of a fracture of the ribs, and of an emphysema which is formed in this region, that is, of the penetration of atmospheric air, into the subcutaneous cellular tissue. The life of the patient, nevertheless, did not seem endangered : the emphysema was slight, and had hitherto been confined to the left side of the chest, there was no cause for thinking it had attacked the internal organs, and experience has demonstrated, that when this phenomenon is circumscribed in a small region, and the infiltration is reduced to a few cubic inches of air, these are absorbed in a short time and very easily. The case is far different when the air has affected not only the whole cellular tissue of the surface, but also that of the internal organs of the thorax, and even of the abdomen, when there is not only infiltration, but also effusion of air into the great cavities of the serous membranes : such is the severe case of another patient we shall mention directly. We must also mention the concomitant lesions, direct causes of the development of the emphysema. Doubtless the fragments of the ribs fractured by the wheel, (we have mentioned the signs of this fracture,) pressed against the pulmonary organs, have torn the pleura, or perhaps the air vesicles, to a greater

or less extent: hence an organic lesion of the lungs and the penetration of the air towards the parietes of the thorax. In this patient, the small quantity of air which deviates from the natural passages, leads us to suppose that the laceration is small. Let us now explain the manner in which this infiltration occurs. When, in consequence of old pleurisies or pleuropneumonies, organic adhesions exist between the two pleuræ, and there is thus established a continuity of tissues between the surface of the lung and the wall of the thorax, the emphysema is certainly easily understood: the air passes directly from within the lung into these cellular meshes of the new organization, proceeds from place to place, and thus comes through the fractured wall into the subcutaneous cellular tissue. When there are no adhesions, the air which is inhaled, partly escapes through the opening on the surface of the lung, and is distributed first into the surrounding tissue, and the cavity of the pleura. It is then expelled in every direction by the alternate motions of expansion and depression of the respiratory agents, and by its elasticity it penetrates progressively into the cellular tissue of all the external and internal organs: so that if the quantity of effused air be considerable, it not only affects the parietes of the thorax and abdomen, the upper and lower extremities, the interior of the scrotum, the neck and the head, but also the pleuræ, the two mediastina, the pericardium, and the cellular tissue which unites the different organic elements of which the lungs are composed.

This patient was bled the day he entered the hospital: the next morning M. Dupuytren prescribed bleeding again, and some other remedies: compresses saturated with a resolvent solution were applied to the affected side and the trunk enveloped with a bandage. In proposing this last remedy, the professor designed to suspend the respiratory action of the external muscles, and to oblige the individual to breathe only by the diaphragm, in order to favor the union of the fractured ribs and to oppose as much as possible the causes of emphy-

sema. After stating the different agents of respiration, and describing the mechanism of this physiological phenomenon, he proves by instances the possibility of breathing by the aid of this internal muscle: in fact this occurs when all the external muscles are paralyzed from an injury of the upper part of the spinal cord.

The other patient is older than the preceding, and of a much stronger constitution; being engaged in a quarrel, he was thrown down by his adversary, who stamped upon his chest. Several ribs were fractured: fragments of these ribs were pushed in violently, and wounded the lung severely: an enormous emphysema followed, which immediately extended to the shoulder, then to the anterior and posterior region of the thorax, and to the neck, which was considerably swelled the day after the accident, and finally to the abdominal region and the testicles. This man also was affected with chronic asthma, which is unfavorable in such cases. An emphysema existing in so great a degree, continued M. Dupuytren, is always a very serious disease: infiltration progresses rapidly; the atmospheric air, as we have already stated, quickly penetrates into the cellular tissue of the internal organs, and the patients are soon unable to breathe. We have seen several die in extreme anguish from suffocation by the cause we have mentioned. Judge of what must happen when the respiratory functions are diseased by a severe asthmatic affection, and by an emphysema, like that before you. The patients immediately perish: we have then entirely despaired of the old man's life. In fact, you have seen to-day, the deep anxiety which agitates him, his powerless efforts to reply to our questions; at each inspiration, a new current of air escapes through the opening of the lung and incessantly aggravates his situation: there is not only infiltration, but also an effusion of atmospheric air into the great cavities: the expectoration is bloody, which indicates a serious injury of the lungs: the pulse is small, contracted, and convulsive. With such bad

symptoms, the resources of art are vain. What can be done? Can we employ the same remedies as in the former case? This would hasten his death: for to confine his body with a bandage would increase his pains. Incisions in the skin have been advised, in order to open a way for the infiltrated air; although we have not the least confidence in this practice, we have made several in different parts of the body, and particularly near the pectoralis major muscle, rather in order to conform to received opinions, than in the hope of obtaining any good results: they have been useless, and it would be superfluous to explain why. If we had to prescribe for a slight emphysema, which was confined to a small part, where there is a prospect of treating successfully the cause which has produced it, and in which, consequently, organic lesions are not beyond the resources of our art, we can conceive that incisions over the region where it is situated, may prevent the air from proceeding farther, by making an opening externally; but in cases like this before us, you can see it would be insufficient, and hence we shall dwell on it no longer.

The prognosis of M. Dupuytren was verified: the patient died a few hours after, and the post mortem examination confirmed his diagnosis in all its details. Externally there was a general swelling without discoloration of the skin, uneven, soft, easily depressed, and displaced by the hand, and attended with that crepitation which distinguishes it. Internally, we remarked particularly, the great quantity of air in the anterior and posterior mediastina, and the presence of this fluid in the whole of the interlobular tissue as the professor had predicted. Three of the right ribs were fractured, and the side of the right lung presented a large and deep laceration.

The first patient, on the contrary, soon mended. After five days, his sufferings in the affected side ceased; coughing caused no pain, the expectoration was perfectly free from blood, the infiltration had disappeared almost entirely, the pulse was good, respiration easy, and the appetite returned: in fact, this man was convalescent.

In these two patients the emphysema played an important part in the course of the disease; it was the most apparent symptom, and existed to so great a degree that it alone was a fatal disease, independent of the severe lesions which caused it. Sometimes it appears among the symptoms of the second kind, and then it is not easy to recognize it. However it is necessary to determine its existence, both to oppose its further progress, and because when once admitted, this symptom is a powerful aid in determining concomitant disorders.

A man, forty-one years old, and of a strong constitution, was pressed against a wall by the tongue of a cart: he was brought to Hotel Dieu, his respiration was short and difficult: on the left there was no perceptible injury: but the sternum was fractured transversely at the union of the two upper thirds with the lower: the upper fragment was depressed deeply towards the mediastinum. On the right, there was a depression on a level with the fourth, fifth, and sixth ribs, at four or five fingers breadths from the sternum, at the base of which was a crepitation, indicating the fracture of these bones, and probably also of their cartilages. We could even distinguish very distinctly with the tip of the finger, the projecting extremity of the external fragments. A little below these fractures was also an ecchymosis, as broad as a five-franc piece. The patient had a very anxious countenance, he spoke but little and interruptedly, his pulse was small, almost imperceptible, and quick, the skin was cold. When the parts over the fractures were examined, there was a crepitation similar to that produced by the air in passing through the cellules of the cellular tissue: but it was remarkable that at each inspiration this tumor increased considerably and extended from the lower part of the sternum to the fracture: it was depressed, on the contrary, during expiration: at the depression resulting from the fracture of the ribs, the skin was raised and depressed in the same manner, but formed a much larger tumor. The least pressure produced the emphysematous crepitation and caused the tumors to dis-

appear. In the two lower thirds of the right cavity of the chest, the stethoscope indicated a very distinct gurgling. He was bled and resolvent compresses were applied to the tumors, and his body was bandaged moderately tight. The patient was pleased at first with this compression, as it diminished the pain: but on the fourth day, the oppression suddenly increased, the cheeks were flushed, the pulse became very quick, hard and small; he was bled again. For ten days the patient was alternately better and worse, the difficulty in respiration subsiding and returning: the tumor above mentioned had disappeared, and there were no traces of emphysema: but a broad and very black ecchymosis extended from the base of the chest to the upper and outer part of the thigh: the chest became more and more obstructed, and the patient died on the twelfth day. On examination, old and very strong adhesions were found between the two pleuræ, the upper fragment of the sternum was engaged in the pericardium, and the right ventricle of the heart was torn by this fragment for two-thirds of its thickness, a great quantity of bloody serum and also of black blood, nearly pure, existed in the right pleura: the fourth, fifth, and sixth ribs were fractured, and their cartilages were detached from the sternum. Between them was a laceration, broad enough to admit the finger easily.

TRAUMATIC EMPHYSEMA OF THE EYELIDS.

The introduction of the air in the cutaneous or intermuscular cellular tissue, is caused not only by penetrating wounds of the thorax; it may take place in all regions adjacent to the respiratory apparatus. Emphysema of the eyelids is not a rare disease: several authors have mentioned it, and many cases of it have been seen at Hotel Dieu.

Emphysema of the Eyelids, in consequence of a suspected fracture of the flat portion of the ethmoid or of the unguiform bone.

A laborer, twenty-five years old, was struck by a quantity of earth on the right anterior portion of the head, neck and chest: when extricated from it, he felt only a slight pain at the root of the nose, to which he paid but little attention, and continued his work. About a quarter of an hour after, while blowing his nose, the eyelid on the left was considerably swelled: this tumefaction extended until the eye was entirely covered. What was the cause and nature of this swelling? Was it erysipelas? The skin, in fact, was shining, tense, as in this affection; but there was neither that more or less vivid redness, nor that burning heat which mark it: the eyelids preserved their natural temperature and color. Was it œdema? But œdema does not form so rapidly, and we do not remark that clamminess of the tissues which is peculiar to serous infiltration. Had this man received a violent contusion which had caused an effusion of blood? But then we could discover this sanguineous effusion by numerous violet ecchymoses, and the general more or less deep brown color of the eyelids. From these negative signs, then, we had reason to expect that the swelling was produced by an infiltration of air: and, in fact, having carefully touched the organs, we proved very evidently, the emphysematous crepitation, not merely in one part, but in its whole extent. Not wishing to trust entirely to ourselves, we requested several of you to examine the patient, and you received the same sensation. It would be useless to demonstrate to you by facts, that this crepitation is a characteristic sign of the presence of atmospheric air in the cellular tissue of the tumefied parts. Whenever incisions are made in the skin with a bistoury in such cases, some air escapes from the openings. In cadavers of patients

who have died from emphysema or from concomitant organic lesions, this fluid has been found to exist wherever this crepitation was felt during life. Having under our charge, a patient in whom these symptoms were very evident, we were induced to make a few incisions in the tumefied part: a great quantity of air instantly escaped from the incisions. We ought not, then, to have the least doubt in this respect; but in the case before us, we wish to know how this infiltration occurred. We think that the earth, having pressed forcibly on the face, the flat portion of the ethmoid or of the unguiform bone was ruptured, and the air passed from the nasal fossæ into the eyelids, through this opening. It is curious that the emphysema did not appear immediately after the accident, but that some time elapsed before it was seen, which was not till after the effort of blowing the nose. The cause of this peculiarity is not inexplicable: without doubt, the fracture of the ethmoid or of the unguiform bone, not having at first torn the soft parts which line it, these might prevent the passage of the air: but afterward, the patient, by the exertion of blowing, having pushed with violence a strong column of air against these parts, they were torn, and a communication was thus established between the nasal fossæ and the eyelids. We were curious to know, added the professor, if there had been any discharge of blood from the nose, after the accident. All other patients with this complaint presented this symptom. In him, however, this hemorrhage did not seem to have occurred. The treatment consisted in general bleeding, and the application of compresses dipped in a resolvent solution over the base of the orbit. M. Dupuytren recommended the patient particularly not to blow his nose; to avoid all exertion to cough; to do nothing which could renew the passage of air through the suspected opening, and he mentioned that he would be well in a few days. In fact, the third day after entering the hospital, the crepitation was much less: the fourth day it was

almost imperceptible, and the fifth, the eyelids were nearly in their natural state.

The following case is extremely analogous to the preceding, from which it is perhaps distinguished only by a slight difference in the situation of the injury, the cause of the emphysema.

Emphysema of the Eyelids, in consequence of the presumed rupture of the pituitary membrane.

Another young man received a violent blow on the nose, by the fall of a plank ; at first he felt a severe pain : but some hours after, on blowing his nose forcibly, he felt, as it were, a stream of fire, which ascended from the sides of the nose to the great angle of the eye, and which extended into the left eyelids. They soon became so large that the left eye was entirely covered, and the passage of light intercepted. The patient was admitted at Hotel Dieu. The eyelids were very tense, glistening, but indolent, and the color of the skin was unchanged. The emphysematous crepitation was ascertained. The same mode of treatment produced a complete cure in four or five days. M. Dupuytren thought that the blow received by the patient had ruptured the pituitary membrane opposite the union of the lateral nasal cartilage, which had been detached from the lower edge of the nasal bones.

Emphysema of the temporal region, in consequence of a fracture of the frontal sinus.

Emphysema may be produced in the most elevated part of the respiratory passages, by causes much more serious than in the preceding cases. The following is an instance.

A man fell, striking upon the anterior part of his forehead. Some time after, a large tumor was developed in the temporal

region. Its character seemed difficult to determine by several persons, when M. Dupuytren, compressing it slightly, pushed it toward the anterior part of the forehead, and it disappeared entirely. It was caused by air passing into the surrounding cellular tissue, which air came from the frontal sinus, which was broken and open under the skin.

It would be easy to multiply instances of traumatic emphysema, resulting from a penetrating wound in the chest, or from a communication of another character, caused by an external injury of the other regions of the air-passages. But we think that those already mentioned, and the remarks we have made, are sufficient to give an exact idea of this singular class of diseases, and to make known the bases of the diagnosis, and the proper treatment. A few remarks remain to be added, in respect to the penetration of air in the highest parts of the respiratory apparatus. Besides the emphysematous crepitation, and the negative signs we have indicated, we also see, that whenever we request the patient to blow his nose with a slight degree of force, in order to assure ourselves of the nature of the evil, the swelling of the eyelids or of the other affected parts sensibly increases. If we have before us a patient who is insensible, by pinching the nose, the tumor increases instantly; this increase is produced by a column of expired air, which finds no issue through the nostrils, and goes entirely into the new channel accidentally established.

In all cases of emphysema of the eyelids, the development is extremely rapid: this doubtless depends on the great laxity of the cellular tissue situated within them.

ARTICLE VII.

CARIES OF THE VERTEBRAL COLUMN.

Fistulous Openings and Symptomatic Abscesses.

ABOUT two months since, a female came to Hotel Dieu, to be treated of an abscess in the upper and inner part of the thigh. This woman was also affected with curved spine. We know that the spinal marrow is never compressed, when the curve is not at a right angle, and, that consequently, there is no paralysis of the lower extremities. This was the case with the patient in whom the bodies of the vertebræ were carious. The tumor in the thigh broke, and some pus was discharged. Another tumor formed on the opposite side; this was smaller, but manifestly had the same origin. It was evident that these two abscesses communicated with the carious part, by two fistulous openings. This patient has been treated for three months with preparations of iodine, and was supposed to be cured; but this was far from being the case. The caries progressed, and she came to consult us. We applied moxas to the sides of the curvature. For a month, her health seemed very much improved, when, from a change of air, or from an absorption of pus, she showed symptoms of a pleuropneumonia. We attempted to arrest its course, by repeated applications of leeches to the affected part, blisters to the sternum, topical emollients, &c., but in vain. The patient died, December 15th, seven or eight days after the attack of pleuropneumonia. *Autopsy, thirty-six hours after death—external appearance*: cadaver emaciated; the spinous processes of

the eleventh and twelfth dorsal vertebræ, prominent : marks of cupping on the right side of the chest. *Head*, nothing remarkable : *chest*, considerable sero-purulent effusion, with loose or adherent false membranes : the corresponding lung is collapsed without any engorgement. *Abdomen* : some organic adhesions on the liver and in the lower pelvis, are the only traces of an old peritonitis. The mucous membrane of the stomach is pale, and congested in its lowest portion.

The body of the eleventh dorsal vertebra is destroyed in every direction by the caries. The vertebral canal is not contracted, and the appearance of the spinal marrow is natural. The bodies of the tenth and twelfth vertebræ are partially denuded, and present a superficial caries. A vertical section of the antero-posterior diameter, shows a softening ; the scalpel penetrates easily. In front of the eleventh dorsal vertebra, the cellular tissue and the periosteum are thickened and hypertrophied : they form a pouch with thick, resisting parietes, which has a grayish internal surface, in contact with pus and purulent false membranes. This pouch adheres also to the bodies of the diseased vertebræ, by some resisting bands.

From this pouch proceeds a fistulous passage, within the sheath of the psoas muscles, the fleshy portion of which is wasted and discolored. These passages are filled with pus ; that of the right side is broad enough to receive several fingers : it contains unhealthy serous pus : it is lined by thick false membranes, below which is a smooth and apparently mucous membrane, of a rosy color. This passage is dilated above the crural arch, contracted under this arch, and again dilated at the upper part of the thigh, where it forms a large pouch which contains the small trochanter and other newly formed bony parts. The fistulous opening in the skin communicates with this abscess. The opening in the left side also comes from the pouch situated in front of the vertebra, passes through the fleshy fibres of the psoas muscles, and comes on their inner and anterior edges on a level with the brim of the pelvis : thence

it passes under the crural arch and opens on the inside of the thigh, without presenting the least dilatation. Its inner surface is grayish, and covered by a newly formed mucous membrane. Below this membrane is a whitish, resisting and entirely fibrous tissue. This tissue constitutes nearly the whole canal: it is formed at the expense of the cellular tissue, through which the pus first passed. This fistulous opening has already contracted, it cannot admit the little finger, and its cavity in some parts is nearly capillary. Every thing shows that nature attempted to cure this fistula.

Hunter was the first to mention the formation of these apparently mucous passages: but M. Dupuytren has added much to Hunter's remarks and thrown a great deal of light on the subject.

The canals, said M. Dupuytren, which establish a communication between a carious point and a part of the body, those which go from the urethra to the perineum, or to the neighborhood of the anus, the fistulæ which proceed from the canal of Stenon to a part of the face, the canals which establish communications between the air passages and surface of the body, have all the same nature, the same organization. Accidental and abnormal, they however replace the natural passages which are destroyed, perforated or contracted: often also they take the place of these latter, giving passage to the materials which previously passed through them. These accidental passages are developed at the expense of all the parts with which the pus or the liquid is successively in contact. Thus the fibrous, nervous, osseous and mucous tissues can all enter into their composition. This fact was fully demonstrated by examining the fistulous passages in the patient above mentioned. In fact we there found mucous tissue, osseous substance, nerves, veins and cellular tissue. Each of these parts, added the professor, furnishes one element, the cellular tissue in which appear the fleshy granulations which unite them. These channels soon give passage to certain formations, and

assume the mucous structure. In the case, for instance, of caries of the vertebral column, the following is the manner by which these canals are organized. When caries once appears, the pus continues sometime in the carious point, in the surrounding parts, and particularly in the cellular tissue. There a cyst forms first where the matter collects. The quantity of pus becoming greater, the cyst assumes a sloping position: it lengthens, directing itself from one or both sides of the vertebral column; the pus then progresses forward, pushing before it the lower extremity of the cyst: if an obstacle presents itself, it dilates: it contracts when compressed between the parts and again dilates if the region be open. After proceeding some distance, the pus comes under the skin, projects, and forms a tumor, which finally breaks.

This purulent collection termed a *congested abscess*, and to which M. Dupuytren has given the more proper expression of *symptomatic abscess*, constitutes a very serious disease, and one generally considered fatal. Some well attested cases, however, prove that these abscesses may dry up, close and disappear entirely, when we are successful in curing the caries.

When treated actively by cauteries, moxas, internal remedies, and a proper hygienic regimen, the caries may be arrested and cured. But will the abscess terminate as favorably? Ought it to be left to the resources of nature alone, or to be treated by surgical remedies? The ordinary progress of the disease must serve as a rule in this respect.

Sometimes these abscesses remain in the same state for many years, and without causing any bad symptom: the pus is gradually absorbed, and no traces of it remain: sometimes the skin which covers it inflames, opens, and gives passage to this pus, which escapes and does not form again. In other cases the pus continues in the abscess for some time, and then changes into an adipocerous matter: in fact chemical experiments have proved this to be the nature of the substance sometimes found in this kind of abscess.

M. Dupuytren treated, a number of years since, a young merchant who lived at this period in the Rue aux Ours, and who was affected with a congested abscess, coming from a caries of the vertebral column, attended with a considerable curvature: this caries was cured by the constant employment of moxas, cauteries, &c. The abscess never disappeared, it however diminished a little in volume: five or six years afterward the patient died of pleuropneumony. An autopsy was permitted, and the caries of the spine was entirely cured, the curvature alone remained: the abscess was changed into a fatty, soft, unctuous matter, presenting all the physical and chemical characters of adipocere: the channel or fistulous passage which extended from the carious parts of the vertebral column to the abscess, was contracted, interrupted in several parts, and this matter was found also in its parietes.

M. Dupuytren thinks it dangerous to open symptomatic abscesses, resulting from a caries of the vertebral column, which has yielded to remedies; this course exposes the patient to a relapse of the principal disease, and to lose the fruit of a long and active treatment. He therefore recommends that all these abscesses should be left to the efforts of nature alone; this is also the proper course to be pursued when all attempts to cure the caries are ineffectual.

We have stated before, the composition of fistulous openings of the vertebral column: we shall find the same structure in the formation of urinary fistulæ. I suppose, said M. Dupuytren, that the urine accumulates in a large pouch, and in very great quantity: after some time, an abscess forms. This soon opens and a fistulous passage remains. From this time an accidental canal of a mucous character appears in this course. What are the consequences of this formation? If a sound be introduced into the urethra, when the abscess is first opened, the fistula is easily cured: but if it remains six months or a year without this, the cure is then almost impossible, because a definite organization is established. Thus in the beginning

the parts are too weak to resist ; but after six months, or one or two years, the fistulous passages are so analogous in structure to a definite organization, that they remain and furnish a substance nearly similar to that of the mucous membranes. These fistulous passages do not at first present their permanent characters. They generally begin by an abscess which opens and from which pus is discharged which varies like the cause : sometimes it is white and consistent, sometimes thin and flaky, sometimes pure, and again mixed with the product of some natural secretion ; there are but a few fistulæ which do not commence in this manner, and these are formed from a wound in an excretory canal ; in this case the liquid which passes through the wounded duct, usually follows the same course as the wounding instrument, and the fistula which remains is merely a simple passage. In the first case, on the contrary, that is whenever nature alone causes the development of the disease, the liquid which is accumulated escapes from one or several points. If the abscess lie near the outside of the body, the opening which forms extends directly to it, and the length of the passage equals the thickness of the parietes of the abscess. When this is situated deeply, there forms either a single abscess, which opens externally by one or more openings, or several abscesses, which unite in one, or open separately. This is the first period of the existence of fistulæ.

If the course of the fistula be very short, the phenomena of the second period are simple : inflammation subsides, the edges of the fistulous opening become accustomed to the presence of the liquid or extraneous fluid ; they cicatrize, but do not unite, and the opening remains. If the abscess be situated more deeply, the part becomes the seat of very remarkable phenomena. Its parietes contract, but do not adhere, and the extremity of the origin of the fistula is connected with it. The external opening, that from which the discharge comes, and of which, one or more may exist, contracts, becomes round, and soon appears in the form of a small

red fungus, presenting at its centre an opening which is sometimes hardly perceptible, and is narrower than the canal of which it is the orifice, and which may furnish a quantity of pus entirely disproportionate to its apparent size. At the same time, an inflammation appears in the part through which the fluid passes : this is at first very intense, but becomes less violent in proportion as the parts become accustomed to the irritating material. This inflammation, without disappearing entirely, soon gives place to a process by which the whole passage becomes organized, is insulated, and changes into a true excretory canal : this canal presents the same characters, in whatever tissue it may be developed ; it is generally single, but it sometimes ramifies at its extremities ; it is sometimes straight, sometimes tortuous, and lined, as we have stated above, by a real mucous membrane, which, in fact, cannot be separated except in a few rare cases, but can always be recognized by its appearance, by the fluid it discharges, the organic elements which compose it, and differs from the natural mucous membrane, only by the absence of follicles, and a layer of epidermis.

In some cases, where the inflammation is passive, the canal is so completely organized, that it is covered externally with a layer of cellular tissue, analogous to that around the natural excretory passages : this has been termed by anatomists the sub-mucous cellular tissue : but in most cases, the irritation continues in the surrounding tissues, and these becoming indurated, form different sized masses through which the fistulous passages proceed.

I have said, added M. Dupuytren, that these accidental canals are similar to the natural mucous canals : the instance before us proves the truth of my assertion. Thus you perceive here a false membrane, similar to that found in inflammation of the esophagus. This is removed by scraping, and the subjacent membrane is red, like the natural mucous membranes ; like them it is soft, villous, and if examined with a

glass, we can distinguish very plainly the villousities, which are, it is true, less distinct than in the natural state, but are easily recognized. If we pursue this comparison, we find externally, a fibro-cellular membrane, similar to that which surrounds the mucous membranes. Sometimes nature tends to heal these fistulous passages; the following is the mode. The mucous canals cease to give passage to a liquid, whatever may be its nature, and the tissues which compose it being contractile, like all the tissues of the organism, contract; their parietes approach each other, they unite, and finally change into a fibro-cellular cord, which after some time, say within six months or a year, partially or entirely disappears. How do these canals disappear? In the same manner as they are formed: they are formed at the expense of all the tissues which occur in their course, taking the elements of their organization; they disappear by restoring again what they had received. The truth of these assertions has been proved by pathological anatomy. In some of those persons who have been cured of symptomatic abscess, and who have afterwards died from other diseases, the fistulous passages were changed into a cord, as we have stated: in others, the continuity of the cord was interrupted, and there were only some remnants of it here and there in different parts of its course: finally, in others it had completely disappeared. The following case, selected from among many others, is extremely curious in this respect.

A female entered at Hotel Dieu for a strangulated hernia, which caused an unnatural anus. No one could doubt but that in this case the intestine adhered to the parietes of the abdomen. About two years after, she entered at Hotel Dieu with another disease, of which she died: autopsy took place. For a moment M. Dupuytren imagined himself mistaken in his diagnosis, for there were no adhesions; but on unfolding the circumvolutions, there appeared a cord, which opened at the upper part of the crural arch, and which went to the

intestine ; thus M. Dupuytren's opinion was verified, that in similar cases, the accidental passages carry to the adjacent parts the elements they have received from them.

In the female who was the subject of the first case, the old passage was diminished in size, while the recent duct was larger. The parietes of the first almost touched : within it, was an albuminous matter, similar to that of the false membranes. It was by this, the reunion would have been caused. It is true that the natural mucous passages are obliterated with difficulty : nevertheless, there are cases of it : the proposition of Bichat, also, although true generally, is capable of some exceptions. Accidental canals, on the contrary, are more liable to be obliterated easily ; the reason is, that the former have a very active secretory apparatus, which is but slightly developed in the second. Thus, a square inch of the natural canals would present a hundred villosities, while the same extent of the accidental passages will have but five or six.

Our remarks prove the necessity of opposing, as soon as possible, the organization of accidental passages, and of re-establishing quickly the natural course of the secretion by all proper means. But when this end cannot be attained, the same modes become insufficient, and almost inexplicable. The only course then to be pursued, is to remove the parts.

Cauterization also is useful, but the actual cautery must be straight, and pass exactly through the canal. In other cases, we must use injections of nitrate of silver, or nitric acid very much diluted with water, being careful to keep these fluids in the proper channel. For these injections, M. Dupuytren uses twenty, thirty, or sixty grains of the nitrate of silver, to one pound of distilled water, and injects it with a syphon syringe. He has remarked that these injections have succeeded when the fistulæ were of a scrofulous character.

ARTICLE VIII.

HYDRO-SARCOCELE.

A case, curious from the difficulty of its diagnosis.

A SHORT time since a physician of the navy came to consult me, for an affection of the left testicle. It had been considered by some of the profession who had examined it, as a hydro-sarcocele. The following are the circumstances of the case. During infancy, the left testicle of this patient had not descended into the scrotum. A tumor, which varied in size, frequently appeared in the course of the spermatic cord, descended more or less, sometimes even into the burzæ, and gradually reascending, disappeared again through the inguinal ring. Finally, it removed out of the abdomen. It was believed that a hernia existed, for the patient from infancy constantly wore a bandage. This fact should be remembered, as it had a powerful effect on the modifications which afterwards occurred in the organs: now we may admit as a principle, that whenever a bandage is not useful, it is almost always injurious; it maintains a constant pressure, the effects of which are generally bad: it has often caused engorgements of a schirrous nature. For some years, however, the patient, who was now thirty-two years old, had left it off. Another circumstance to be noted is, that the tumor frequently varied very much in size; during a long voyage of a year, which he had been obliged to make, it increased considerably: on his return he perceived a fluctuation at the lower and anterior part: above

and behind this fluctuation, was an induration. When I first saw the patient, I thought that there was a collection of fluid, but it was difficult from what had previously occurred to determine what organ was represented by the hard part mentioned. I thought there was an engorgement formed by a hernia with adhesions; I advised rest, baths, topical emollients, and then attempts at reduction; but they were unsuccessful.

The patient's business required him to take another long voyage, and he was determined to be rid of the affection at any rate. The situation was a difficult one for the operator. There was in fact a collection of liquid; but this was the only thing certain; beyond this, all was obscure. It is often very difficult to distinguish hydrocele, complicated with a cartilaginous thickening of the vaginal tunic, from sarcocoele; but farther, we had to inquire if this hydrocele existed alone, if it were attended with sarcocoele, or with an engorgement of the testicle, or with a hernia, and if this hernia had or had not formed adhesions: for one or the other of these hypotheses might be true. These complications occur constantly, and these different circumstances regulate our course of practice. We thought at first of making a puncture by way of experiment, but we were doubtful how to proceed. The use of the trocar, which is harmless and very convenient in the case of simple hydrocele, would here be very dangerous, if the tumor were formed by an engorged testicle, or by the presence of the intestine, and we ran the risk of wounding one or the other of these organs. On the other hand, if sarcocoele existed, the puncture would be useless.

From these considerations we determined to open the tumor with the bistoury. An incision about an inch long was made along the lower part of the integuments, extended a little backward, and gradually and carefully carried to the sac containing a fluid. This sac presented a bluish and glistening appearance. Having pierced it with the point of a bistoury, a liquid immediately escaped, similar to that of simple hydrocele. Wishing to prevent the infiltration of this liquid into the cellu-

lar tissue, we enlarged the incision ; the quantity of fluid which escaped might be estimated at from eight to ten ounces. The tumor lost only about two-thirds of its bulk. We could then see evidently that the rest of the tumor, this hard part of which we have spoken, was formed by the testicle itself. But in what state was it? This was the important question, which it was desirable to resolve. Did this engorgement depend on a venereal or scrofulous disease, or rather on an external cause? We learned on questioning the patient, that he had been affected with gonorrhœa once, which continued five or six days only ; on the other hand, although he appeared in some measure to be of a scrofulous habit, yet this affection could not be said to have been developed in him : the patient is of a good constitution, and has always enjoyed perfect health. We then had every reason to think, that this engorgement was caused by compression exercised for several years on the testicle by the bandage which was applied to keep the herniary tumor in place. Finally, in case it was the effect of venereal disease, ought the operation to terminate here by uniting the wounds, and attempting the resolution of the tumor by antisyphilitic remedies? All conclusions on this subject should yield to the more or less positive knowledge of the state of the organ, while the circumstances we have mentioned, would only serve to guide us in respect to calculating the chances of amputation.

Having carefully examined the testicle, we found on its surface a number of prominences and inequalities : it was hard and nearly indolent : this hardness was particularly remarkable in the epididymis, which had enlarged very much.

We then had strong reasons to believe in the disease of a great part of the organ, and we resolved to remove it. But desiring previously to ascertain the state of the upper part of the spermatic cord, which we perceived to be sound, and that of the inguinal ring, we arrived at this ring without difficulty,

and we found it broadly open and perfectly free. We could then conceive why the tumor varied so much in size: it evidently arose from the alternate hernia and spontaneous reduction of a fold of intestine. But how did it happen from this arrangement of the ring, that the tumor which contained the liquid could not be crowded back into the intestine, notwithstanding it was attempted? We found it explained by the arrangement of the epididymis; this organ placed at the entrance of the ring where it was crowded by the tumor, closed the opening completely. We know that in dogs, a fold of the peritoneum, placed there as a kind of valve, opposes the return of injections pushed through the vaginal tunic. In this patient, the epididymis would fulfil abnormally this function of the peritoneum, which is natural in dogs.

From this peculiar arrangement of the ring, the operation might be followed by two accidents, which would be equally injurious. On one hand, a portion of the intestine might leave the abdomen, and come into the wound, as sometimes happens after the operation for strangulated hernia; or, if hemorrhage supervened, the blood being effused in the peritoneum, might cause a violent inflammation of this membrane. To prevent this we thought proper to tie carefully the vessels of the cord, and those also of the integuments.

Let us recapitulate the circumstances of this interesting case. This tumor was formed by a collection of liquid, by the enlargement of the testicle, and accidentally by the hernia of a fold of intestine. This collection of liquid, estimated by us at eight or ten ounces, was produced by the morbid secretion of the vaginal tunic, and formed a real hydrocele. Although the inguinal ring was perfectly open, the communication of the vaginal tunic with the peritoneal cavity not being free, on account of a peculiar arrangement of the lower part of this canal, it was impossible to reduce the sac which contained the liquid. We thought it most prudent to remove the testicle. The operation it is true was painful, long, and difficult, but

this should not be mentioned in comparison with the bad symptoms which would result from the further progress of the disease, or from an operation proposed with a different view. Further, the examination of the diseased part decided upon the propriety of our views and conduct. The testicle, which was three times the usual size, when divided with a bistoury, proved to be carcinomatous, but in the first degree, that is, without degeneration and without softening. This was a fortunate circumstance, said the professor, for it gives more chances of a radical cure of the disease. The epididymis, which was at least four times its usual size, was in the same state. The general constitution of the individual, the integrity of the cord, the presumed nature of the cause of this affection, all induced us to think that the cure would be complete.

ARTICLE IX.

OF PROLAPSUS RECTI.

M. Dupuytren's Mode of Treatment. General Remarks.

It is constantly said, remarked M. Dupuytren, that surgery is a science now carried to the highest state of perfection. Every day, however, the operative department is enriched with more or less important discoveries. It is now some years that M. Boyer has cured fissures in the anus by simple incisions. The prolapsus of the mucous membrane of the rectum, an affection which, if not very serious, is at least very inconvenient, had been treated hitherto by means which were generally powerless, or

simply palliative in their effects. We, however, have succeeded in curing it perfectly by an operation, as simple in its execution as it is certain in its results. This disease, which is more common in infancy and old age than at other periods of life, consists in the inversion of the intestine, the upper part of which is invaginated in the lower to the level of the anus, and which continuing outward projects for two, four, five, or even six inches. This prolapsus generally occurs whenever the intestines are evacuated, and in others when they remain standing for a long time.

One mode of treatment, which is the first to suggest itself, is doubtless to reduce the intestine when its prolapsus cannot be prevented: this is easy, in some cases, but not always: sometimes the parts are so swelled, and the sphincter contracts so forcibly, that the intestine is strangulated, and some assistance is required. The membrane which is then displaced is doubled and tripled in size: it assumes a red violet color, is ecchymozed, and is sometimes threatened with gangrene in a greater or less extent. In these cases the reduction must be performed instantly, and in the following manner: the patient lays on his belly, the pelvis raised by one or two pillows, so that the anus is the highest part of the trunk. After enveloping the whole tumor with wet linens, and placing a compress on the centre of its anterior extremity, we press gently on its base to diminish its size, and we gradually push it inward with the finger. Thus the reduction begins with the part which emerged the last. If this reduction is not practicable, some advise to make scarifications; but as these cause wounds, and consequently inflammations of the large intestines, this should be avoided as long as possible. This is true also of leeches, the application of which may cause internal or external hemorrhages and intestinal ulcerations.

Even when the reduction is performed, the disposition to prolapsus still continues; hence this mode, which must be considered rather as a palliative and in some cases as a preser-

vative from serious symptoms, cannot be depended upon, at any time, as a cure. Lotions and cold baths have also been used in order to strengthen the action of the sphincters, and to prevent the prolapsus of the intestine. In fact cold baths sometimes succeed, but they require to be used for some time and cause very disagreeable sensations, which cannot be supported by every patient, and then they must be discontinued. Astringent lotions, and compression with a sponge covered with fine linen and sustained by a T bandage, or by a more or less complicated mechanical bandage, suppositories of different kinds, &c., &c., are sometimes successful in children, after a certain time, but fail particularly in adults and old people. In these cases then we must have recourse to an operation removing the intestine or a portion of it which projects, and the hemorrhoids which may exist on the mucous surface. But this excision, added the professor, the credit of which has been claimed by several practitioners, and among others by Sabatier, exposes the patient very much to bad symptoms, and particularly to a hemorrhage which may become serious, and has sometimes proved fatal. The removal of a greater or less portion of this mucous fold and of hemorrhoids, followed by cauterization with a red hot iron, besides producing severe pain may cause a violent and more or less serious inflammation of the intestine and the neck of the bladder.

These considerations led M. Dupuytren to invent a new mode of treatment less inconvenient than the old method, and more certain in its results; and some years since he performed an ingenious operation which we are about to make known, after briefly describing the anatomical relations of the parts.

The skin which covers the edge of the anus is thinner and of a different color from that of the other parts of the body; it contains a great number of mucous crypts, which secrete an oily matter of a peculiar odor. This skin forms projecting folds, separated by as many wrinkles, which converge from the circumference of the edge towards the centre of the anus;

these folds enter into the anus and are more numerous and prominent the more contracted it is: they disappear or are effaced when it is dilated: we conceive that their use is to facilitate the dilatation of the anus and to favor the excretion of the feces. Under the skin is a layer of a fibro-cellular character, above the external and also the internal sphincter, which are two organs formed by circular fibres of a mucular nature.

The anatomical structure of the parts being known, the following is M. Dupuytren's process: the patient lies on the belly, the upper part of the trunk and the head being low, and the pelvis elevated by one or more pillows: the thighs are separated to show the margin of the anus and the anus itself. The operator, holding in his left hand a pair of forceps with broad extremities, in order to cause less pain, seizes successively on the right and left, and even before and behind, two, three, four, five, or six of these radiating folds, which are sometimes indistinct, or are more or less prominent; he removes each fold as it is raised, with curved scissors held in the right hand: the excision should be extended to the anus, and even within the rectum, in order that the action may extend beyond the opening: the excision may be carried half an inch high, if the relaxation be very great, but a few lines is generally sufficient. If the relaxation be moderate, two or three folds are removed on each side: if very great, more are cut off.

This operation is not very painful, presents no inconvenience, and is not followed by hemorrhage; for bleeding can come only from the vessels of the skin, and the extremities of the hemorrhoidal vessels are alone divided. If however the incision be carried more deeply, the internal hemorrhoidal arteries may bleed.

The consequences of this operation are easily deduced from the anatomical arrangement of the parts: there is an extreme dilatability of the anus: it has been proposed to remove it by cutting off one of the tissues and strengthening the others: this double end is attained by the excision of the skin, and by the

inflammation which supervenes. The cicatrix formed by the approximation of the edges of the wound, and by the formation of an accidental tissue, evidently contracts the anus. By this mode an accidental adherent skin, of a close texture, is substituted for one which was loose and relaxed. The inflammation consequent upon this simple operation extending a little higher in the submucous cellular tissue of the rectum, contributes to increase the adhesion of the mucous tissue with the fleshy tunic. There is no dressing required: the pain causes immediately a lively contraction of the sphincters; inflammation soon extends to the divided parts of the cellular tissue and to the sphincters. Generally there is no stool for a few days: the inflammation soon subsides, the sphincters relax for the discharge of feces, but they contract at the least effort; cicatrization takes place in a few days, and then the feces are no longer in relation with the ulcerated parts, the opening is diminished and the cure perfect. M. Dupuytren first performed this operation more than ten years ago, and he has frequently repeated it, and always with the same success: he has observed no relapse except in one case, where he admitted that it was performed imperfectly, on account of the indocility, the cries and the exertions of the patient operated on. This operation, doubtless, originated with him. That employed by Hey, (Practical observations,) to cure a patient affected with hemorrhoids, complicated with prolapsus recti, differs from it in several essential respects. In fact in the cases mentioned by this surgeon and by those who have imitated him, the patients have been cured accidentally of the prolapsus recti, by an operation exclusively intended for hemorrhoids, and which cannot be applied except where the prolapsus is consecutive to the hemorrhoidal affection. M. Dupuytren's process, however, is particularly applicable to cases unattended with hemorrhoids; the professor is satisfied that the excision of the edge of the anus can alone relieve patients of their unpleasant disease.

The following case communicated by Dr. Paillard, and

which we have recently observed at the clinic of Hotel Dieu, will show the application of these principles.

Case 1. A young female of good constitution, affected with prolapsus recti for several years, entered Hotel Dieu in May, 1830, to be treated for this disease. She knew not to what cause to attribute it. During her stay in the hospital there was no complication of hemorrhoidal affection, but the prolapsus of the rectum presented this peculiarity; it appeared every month for several days, when there was a discharge from the bowels, and then disappeared, not to return till the next month. The inconvenience felt by the patient whenever the prolapsus occurred was very great, the pains, the straining, and the discharge of bloody mucus, &c., &c., were very distressing, and she determined to have the operation performed. The patient laid in bed and on her belly, the pelvis raised, and the thighs separated by an assistant on each side; M. Dupuytren seized with the dissecting forceps a fold of the margin of the anus, raised and removed it, extending the incision as high as possible into the rectum; four folds were thus successively raised forward, backward, and on the side. The pain of the operation was not severe, and there was no hemorrhage: there was no dressing needed, and when the patient had a dejection the rectum did not come down. In fifteen days the small wounds cicatrized, and the patient left Hotel Dieu.

Case 2. In the latter part of November, 1831, a child about three years old, of good constitution, was brought to M. Dupuytren. It had long been affected with a prolapsus whenever there was a dejection. This child, who was in good health, was however of delicate constitution. The operation was performed in the manner stated before: the patient laid on the belly, upon a pillow, the thighs and haunches separated by two assistants: the professor took up in succession three folds, which were removed with curved scissors, to one or two lines of the anus. But little blood escaped. The next day in going to the water closet, the intestine came down, a very rare but

by no means an unfavorable occurrence. Fifteen days afterward the little patient was presented to M. Dupuytren. He was entirely cured: the wounds were about to cicatrize: there was a slight degree of suppuration in some parts.

ARTICLE X.

OF EXCISION OF HEMORRHOIDAL TUMORS.

IN many persons, the lower extremity of the rectum is the seat of bleeding tumors which are termed hemorrhoids. These tumors may exist for life without occasioning any considerable annoyance, but they are often the cause of serious injury, which endangers the life of the patient, and which infallibly terminates in death, if it be not combated. The celebrated Copernicus and Arius sunk beneath hemorrhage, in consequence of rupture of hemorrhoids. Bordeu and Benjamin Bell mention cases of issue equally fatal. This fatal termination has been noticed by the ancients, and they have, said M. Dupuytren, proposed different treatments of this affection, and amongst others, that of ligatures. Hippocrates, in his work *De Ratione Victus in Acutis*, recommends binding the hemorrhoids with a thick, strong, worsted thread. You should tie, added he, all the tumors, with the exception of one; you should not cut them, but you should hasten their fall by appropriate topical applications. Paul of Egina has given the same directions. Celsus thought that the tied tumors ought to be opened with the nail or the scalpel. I mention these different opinions, said the professor, to prove to you that the ancients

knew very well the danger of hemorrhoids. Before we examine the remedies employed against these tumors, it will not be irrelevant to describe their nature, to point out their anatomical structure, and the cases in which it would be proper to apply the treatment of which I propose speaking in this lecture. Many opinions have been stated relating to their nature. Some, with Montegre, think that the blood flows neither from the arteries nor veins, but from the capillary vessels. Laennec and Abernethy considered them to be the result of the formation of new vessels. According to Duncan, Le Dran, Cullen, MM. Recamier and De La Roque, they are formed by the cysts in which the arterial blood is poured. Stahl, Alberti, Vesalius, Morgagni, J. L. Petit, Pinel, Boerhaave, regard them as dilated veins, or real varices, and such also is our opinion.

If we examine, said M. Dupuytren, the composition of hemorrhoidal excrescences, we find that they are distinguished into external and internal. The internal tumors, covered with the mucous membrane of a violet color, form in the rectum a sort of partition; they present between them furrows, which facilitate their being detached, and which often disappear from inflammation. The tissue of this membrane exhibits tumefied veins, resembling the heads of pins, which when an incision is made in them discharge venous blood, and have a spongy appearance. When the mucous membrane is removed there appear false organized membranes, or a cellular tunic, and the muscular membrane constituting the external tissue; voluminous arterial branches are often seen on them.

External hemorrhoids, which form a sort of crown around the anus, are composed:—1. Externally of tumor, the greater part by the rectum and a small portion of the skin. 2. By the false membranes which often exist in the internal tumors or in the nervous tissue, which then seems to be continuous with the *facia superficialis*. 3. By the dilated veins which constitute

the hemorrhoids. 4. By the external sphincter, which encircles their pedicle, and constantly sends fibres to them. 5. By the nervous filaments which extend on the surface ; and lastly, by fat, which is sometimes placed between the skin and these tumors.

These dispositions being known, let us see, continued the professor, in what cases the disorder ought to be left to itself, and when it should be combated by surgical means. It is evident that it would be contrary to all rules to attempt removing hemorrhoidal affections in cases where the patient is weakened by organic disease of the intestines, of the liver, and especially of the lungs. It is a general observation, that in cases which exhibit pathognomonic symptoms of phthisis, the fatal effects of the disease have been checked for some time by the appearance of hemorrhoids, and that in consequence of their untimely suppression, the disorder returned with energy. In the last months of pregnancy, or from the efforts of labor, women often have hemorrhoidal tumors ; they result, in these cases, from an evident cause, and disappear with it. When these hemorrhoids are not disorganized in their tissue, when there is no hemorrhage, nor copious discharge of purulent serosity, which would reduce the patient to a state of serious and characteristic anemia, surgical means are not advisable in remedying these accidents, or rather the inconvenience which they occasion ; antiphlogistics will suffice for their removal. But when the life of the patient is endangered, remotely or immediately—when the annoyance is so considerable as to require prompt assistance, and the hemorrhoids are disorganized, antiphlogistics will not be sufficient ; excision is the only remedy which will succeed. Hence disorganized hemorrhoids, and those which require an operation, will be considered in this lecture.

These two kinds of hemorrhoids, internal and external, may or may not occur simultaneously ; they form a reunion of tubercles, which encircle the anus, some externally and some

internally ; and this species has been named by M. Dupuytren external and internal hemorrhoids. External hemorrhoids are formed by a circle of round smooth tubercles, of a brownish color on the outside, where they are covered by the skin, and of a bright red inside, where the mucous membrane forms their covering, rarely ulcerated on their external surface, they are, on the contrary, very frequently so on their internal, and from thence arise more or less abundant hemorrhages, purulent or sero-purulent discharges, which tend to debilitate the patient. Internal hemorrhoids, situated above the anus, and often strangulated by the sphincter, in consequence of their engorgement, or by the prolapsus of the internal membrane of the rectum, (a frequent complication in hemorrhoidal tumors,) give rise to the same accidents, and are known by the bright red color of the tubercles. These two species of hemorrhoids are sometimes present in the same patient.

The individuals attacked by this malady walk with difficulty in the street ; stopped every moment by the intensity of the pain, they may be seen with their hands behind their back, or sitting down on resting places, in order to push in their hemorrhoids ; others, for the same purpose, rub themselves against walls, but these means only procure them a momentary relief, and a return of pain quickly follows the next protrusion of the hemorrhoids ; more or less exhausted by the abundance and frequency of the hemorrhages or sero-purulent discharges, the patients become emaciated, their skin grows pale, discolored, wan, like wax ; they have the aspect of persons exhausted by other hemorrhages, or by abundant suppurations ; they very often fall into a state of sadness and deep melancholy ; their intellectual faculties become weakened, and they are often found to attempt their lives. Meanwhile the local disorganization progresses, a schirrous affection of the anus and of the inferior part of the rectum shows itself, and death will be the termination of their progress, or the result of the abundant discharges, if they be not successfully opposed.

It is then in those cases, said M. Dupuytren, that we must have recourse to operative proceedings; but to which treatment shall we give the preference? To obtain the radical cure of hemorrhoids, we employ in turn compression, ligature, cauterization, recision, and excision. Let us discuss successively the value of these different means. We might waste the hemorrhoids by compression, but the situation is not favorable for this, and therefore it is given up. The ligature, as we have seen, has been a very ancient practice; its inconveniences are considerable, since it exposes the patient to inflammation, insupportable pain, and sometimes to death, of which the celebrated J. L. Petit has reported an example. Cauterization has been frequently practised. It is of considerable utility when united to excision, but it causes extreme pain, and may expose to great danger if it be applied to voluminous and extensive tumors, which would require the prolonged action of the actual cautery. Recision has been praised by many practitioners: it consists in shaving off the hemorrhoidal tumors with a pair of scissors; but it would seem that a practice which induces hemorrhage, which lets the tumor remain, and excites inflammation, cannot justify the preference which has been given to it. There remains then excision, said the professor, which we employ with the greatest success. Let us now consider how it ought to be practised; we will speak afterwards of its inconveniences, its dangers, and the means of remedying them.

First, the diagnosis being established and the operation decided on, the patient should lie on the edge of the bed on his side, or on the knees and elbows, the two legs extended; or it would be better to have one bent strongly on the thigh, and the other extended. If the tumor is internal, the patient is recommended to make violent efforts, as if going to stool; in this manner it will protrude; it should be seized with a large kind of forceps, while an assistant raises or separates the thighs, and with a pair of long scissors, the model of which

has been given by us, the tubercle can soon be excised. The operation offers very little difficulty.

We generally remove only a portion of the protruding tumor; for if it were taken completely away, the patient would be exposed to severe hemorrhage, and to consecutive contraction of the anus. By this treatment there remains apparently a considerable mass at the verge of the anus, which might seem as if there had not been a sufficient quantity of the hemorrhoids removed; but when cicatrization takes place, the opening will return to its natural state. This is also the case in excision of the tonsils. The excision of internal hemorrhoidal tumors is more difficult. To induce an external protrusion, in order to be able to seize it and remove it completely, the patient should be placed sitting on a warm hip bath, and desired to make expulsatory efforts. As soon as it is protruded, he must lie down immediately on the bed, in the position before recommended, and the operator, quickly seizing it, should not give it time to re-enter, but excise it immediately.

Before the operation, M. Dupuytren is accustomed to administer a gentle aperient, and an enema. We will see afterwards what are the motives of these precautions. The excision is not without difficulty and danger, but the difficulties are easily surmounted, and the dangers can happily be prevented by the precautions which are now used.

The entire danger is the hemorrhage that may follow; where the tumor is external the blood spouts out; the hemorrhage is immediately perceived; and is easily stopped by cauterization. It is to the actual cautery that we must have recourse when the tumor is internal: but in these cases the application of the cautery is more difficult, and the hemorrhage may be easily mistaken. What reveals it to the eye of an attentive and enlightened surgeon, is a sensation of heat which the patient experiences in the abdomen, which seems to advance by degrees in proportion as the blood accumulates in the intestines, or he feels colic pains, and always a peculiar kind of pain, a sort

of tenesmus. The abdomen is sore to the touch, especially towards the groin and the left iliac fossa. Respiration is difficult and interrupted; the pulse, at first intermittent and irregular, becomes small and frequent; the skin is discolored; the face is covered with cold perspiration. The restlessness which the patient at first complains of, is quickly succeeded by despair, which is manifested in his conversation; there is an inclination to vomit, or vomiting, with convulsive contractions of the extremities, vertigo, &c.

This accident once known, we must hasten to evacuate the blood contained in the intestines, by directing the patient to make efforts as if going to stool, and by administering a cold enema. These strainings always bring out the wound; and by means of a cautery heated to a white heat, which M. Dupuytren has expressly constructed, and which he calls *cautère en haricot*, or another which he calls *en roseau*, the place where the blood flows from, should be cauterized: this treatment is always sufficient to stop the hemorrhage; and I have never seen, said the professor, that any dangerous effects followed. Whenever I perform these operations, I take care to have an intelligent assistant with the patient, who, on the first symptoms of hemorrhage, whether internal or external, applies the cautery, and prevents any danger.

Dr. Marx has inquired of me, observed M. Dupuytren, if we should not *always, and in every case, cauterize immediately after the operation*, rather than run the chance of internal hemorrhage, which presents the serious dangers we have already explained. I agree with him, for it results from the recapitulation of a great number of hemorrhoidal extirpations, which I have performed at the hospital, as well as in the city, that this consecutive internal hemorrhage came on unexpectedly in two-fifths of the cases of operations which have not been cauterized; on the contrary, has it never taken place in cases where the cautery has been used. The question then to be decided is, are not the inconveniences of cauterization

preferable to the dangers to which the patient is exposed from hemorrhage? Now it may be remarked to me, that no comparison can be made between them, that the inflammation and tumefaction which occur after cauterization, the irritation which extends to the rectum and urinary organs, generally yield to the simple treatment which I have before pointed out, and have never been followed by fatal effects; while on the contrary, internal hemorrhage puts the patient's life into most imminent danger. Let us suppose a case where some circumstance would not permit assistance to be given in time to the patient attacked by internal hemorrhage, he will perish, and the operator will feel the greatest regret for not having prevented this accident by using cauterization. Finally, it may be said to me, that since this hemorrhage occurs in a great majority of cases, and that it is impossible to know *a priori*, if the patient that is to be operated on may be one of the few who escape the accident, why not admit it as a principle that cauterization should always be used. I acknowledge that these considerations appeared to me to be just, and they will lead us without doubt to modify the treatment which we have used to this day in these cases. A treatment less certain in stopping hemorrhage, is the introduction of a pig's bladder stuffed with lint into the anus. Though it succeeded in the first operation of this kind that I performed, says M. Dupuytren, I perceived that it was very annoying to the patient, and that it was almost always expelled involuntarily by spontaneous efforts, which were induced by its presence.

The other consequences of the excision of hemorrhoidal tumors are much less dangerous and less unpleasant. There frequently appears a considerable tumefaction of the cellular and adipose tissue of the anus; the principal inconvenience attending this swelling is the severe irritation of the rectum, in consequence of which the patient, during four or five days after the operation, feels it quite impossible to go to stool: but the aperient and the enema having been given and with good

effect, strict regimen being observed, this want will be very much moderated, and will remove a constipation of some days, which would be otherwise annoying. This tumefaction may also cause a retention of urine, but we possess most efficacious means of removing this; as for the tumefaction, it yields quickly to the application of leeches, emollient fomentations, baths, &c. The pain attendant on excision is intense, but almost instantaneous, and this annoyance, which is inseparable from the slightest operation, should not be weighed against the pain and danger caused by the disease.

After the operation the patient is liable to different affections, which ought to be the special object of the surgeon's attention, and which it is in his power to prevent.

It must be acknowledged that persons affected with disorganized hemorrhoids, are reduced to a state of profound anemia, to asthenia, brought on by the abundance and frequency of hemorrhages or sero-purulent discharges. These evacuations, to which the patient has for a long period been subject, cannot be suddenly stopped without causing a reaction in the whole system: a general state of *artificial* plethora is induced, sanguine congestions take place in the lungs, liver and brain, and affections of these organs may follow. The patient is often seized with syncope, spasms, giddiness, and falls into a state of alarming insensibility; the arteries pulsate with such violence that one would think that there was aneurismal diathesis, if these anormal pulsations were not changing every instant their seat and form; and it is a remarkable fact, that this plethora co-exists with a pale complexion, the skin generally yellow, or earthy colored, especially the face, and with great weakness. Bleeding, repeated for some time, and at short intervals, if the patient is young, vigorous and robust, and if blood has been discharged from the anus; the introduction of a seton and of a cautery, if the discharge were of a purulent nature; these two remedies combined, if the case require them; gentle laxatives frequently administered: these

are the most approved remedies, and this is the most rational prophylactic treatment we can make use of to prevent a plethora, the existence of which would lead to the most serious danger. When the excision of the external tumor is performed, the cicatrix which remains, either from constriction of the sphincter, or from the tension of the integuments and of the anus, is sufficient in the most of cases to oppose efficiently the protrusion of the internal tumor, and we can then dispense with having recourse to the excision of the latter. Beside, the second excision, like that of the external tumor, is generally without injury, and the patient is completely cured of the disease.

Excision may sometimes be followed by contraction of the anus. J. L. Petit has reported a case where the contraction was such, that the pipe of a syringe could scarcely be introduced ; this accident can be prevented by introducing into the intestines large wicks, and by renewing them until the cure is perfect. Let us now apply the directions given by M. Dupuytren ; his private practice, and that of Hotel Dieu will furnish us with a number of cases.

Case 1. A shoe-maker, thirty years of age, came some time since, for advice for hemorrhoidal tumors, which weakened him very much ; his trade obliged him to sit continually bent ; but he attributed his disease to a visit he made in Champagne, where he indulged in numerous excesses in the wine of that province. It was at that time, in fact, he first perceived that tumors had formed at the verge of the anus. They were at first small, very slightly painful, and only protruded when the patient went to stool ; they afterwards increased considerably in size. These tumors, as in many other cases, presented two stages, one which may be called inert, during which time the hemorrhoids did not discharge, or the discharge was a slight serous oozing, without any inflammatory symptoms ; the other stage, designated hemorrhoidal crisis, is marked by swelling, inflammation, severe darting pains, a

considerable discharge of blood, and afterwards of bloody serum. These crises returned more frequently, their duration increased, the sufferings of the patient became more violent, and his health suffered great injury. When he came to the hospital he was weak, emaciated and yellow; he walked quite bent, and could not straighten himself. This position resulted from a considerable protrusion of the hemorrhoids, which were at least as large as the fist of a child seven or eight years old, and were composed of two tumors, one internal the other external. The patient was besides affected with obstinate constipation, which is often the consequence of an irritation, which extends itself to the rectum, and with a retention of urine, a complication not less common than the preceding. M. Dupuytren recommended the administration of enemas, and the use of baths; by these means the retention of the urine was removed, but the fecal matter remained. The swelling of the hemorrhoids was much diminished, there was less redness, the patient suffered much less.

Leeches, emollient fomentations, baths, enemata, rest, and proper drink, it is true, will not cure the actual crisis, but it is evident that such treatment will palliate it, and that accidents will reproduce this affection at an epoch more or less distant, according to the hygienic state of the patient.

We may be asked, perhaps, what inconvenience would result from the use of this palliative treatment at each return of the crisis? It is the treatment adopted by many physicians; it is also preferred by many patients who dread the operation. It sometimes happens that this temporary relief retards the return of the crises, and renders them more unusual; but more frequently they reappear, and the health of the patient visibly alters. This motive, however allowable it may be, should not be put in comparison to the dreadful effects which the continuance of the disease would bring on; the tumors, external as well as internal, often become schirrous; sometimes the latter, on its development, recedes up the rectum, out of our reach,

and the disorganization extends itself in the inside of the intestines. If to these disagreeable consequences you add the general state of the patient, who presents a severe affection of the system, you will think with me, said M. Dupuytren, that it is necessary to practise excision in the actual crisis. But again, do not think that in giving this opinion, I mean that the hemorrhoids should always be extirpated; I have pointed out before in what circumstances they should be left to nature, and when they should be removed by cutting instruments. After these preliminary considerations, M. Dupuytren directed that the patient should be brought. He lay on the bed on his knees and elbows, his thighs separated, and with the scissors before mentioned, the professor excised the hemorrhoidal tumors; after the excision the wound was not cauterized. Cauterization, though certain in its results, has something appalling to the spectators. I have seen you shudder more than once at the sight of the red hot iron, and at the cloud of smoke which rises from the cauterized part; you may judge what an impression such a preparation would produce on the friends and relations of the patient, who are not, like you, accustomed to such scenes. Meanwhile, fearing that the hemorrhage would supervene, we recommended to the surgeon of the ward to watch the patient with the greatest care, and to apply the cautery if the blood began to flow in the rectum. It is also to avoid this disastrous occurrence, that we make it a rule not to apply the dressings for some hours after the operation, because it is to be feared that the dressings would only hinder the blood from flowing out, and thus cause it to flow back into the superior intestines.

What we apprehended, continued M. Dupuytren, happened the next day; an internal hemorrhage manifested itself; [the pupil of the ward was not mistaken, from the symptoms we had so plainly pointed out; he had recourse to the means that have always succeeded with us. He gave him an enema, which brought away a great quantity of blood, a second enema

brought a considerable clot ; he then made the patient strain, first to expel any blood that might remain, and secondly, to cause relaxation of the sphincter, and exhibit the surface of the divided arteries ; then he applied to the bleeding parts two red hot iron instruments. The hemorrhage did not reappear, and from this period the patient no longer experienced colic pains, nor syncope.

The quantity of blood lost in this operation has been estimated to be three, four, and five pounds. It flows into the descending, the transverse and the ascending colon, and as far as the cœcum, but never beyond this. The patient whose case we are describing, presented a complete assemblage of the symptoms of the disease, and the consequences of the operation. From the effects of cauterization he experienced a retention of urine, and it was necessary to use the catheter ; after the evacuation of a great quantity of urine, he felt violent pain, which did not cease until the organ returned to its usual state. But the inflammation and swelling caused by cauterization are already diminished, the patient is going on well, and in about fifteen days he will be cured. Finally, we know that persons affected with hemorrhoids are subject to obstinate constipation ; in this case it lasted for several days ; excision, as it often happens, has increased it. We have already remarked, that we should not induce stool until the inflammation and swelling have decreased, or even disappeared ; because, before that time, the fecal matter cannot be expelled without causing violent pain, augmenting the irritation, and tearing the parts. It was not until after this time that enemata and gentle aperients were administered. The sixth day after the operation, all these accidents were dissipated, he went with ease to stool, he had no pain, and wished to be discharged.

Case 2. About fifteen years ago, a very wealthy banker, about forty-five years of age, of a bilious temperament, consulted the Baron Dupuytren for hemorrhoids, that were constantly in a state of hemorrhage. These sanguineous dis-

charges had reduced him to a state of great debility and anemia. Pale and debilitated, he was visibly emaciated; he was unable to attend in his counting-house; to write a letter was very fatiguing, and almost impossible to him. M. Dupuytren, after examining him, recognized the existence of internal hemorrhoids, and proposed excision, which was quickly agreed to. Some days after, he proceeded in the following manner: The patient having taken an enema and a hip bath, lay on the edge of the bed, the thighs separated; violent strainings protruded the hemorrhoids, which were immediately seized with a forceps with large blades, and excised, not without much trouble; no external hemorrhage manifested itself. M. Dupuytren did not leave the patient; at the end of a quarter of an hour he perceived him become pale; he fell into a state of extreme weakness, the pulse became small and hard, a cold perspiration covered his body, and he felt a sensation of heat in the abdomen, which was continually ascending. From these signs the professor could not doubt that internal hemorrhage had ensued. He immediately recommended the patient to make expulsatory efforts, and a great quantity of scarcely coagulated blood was discharged; cold injections were useless, the hemorrhage was not stopped: then a pig's bladder stuffed with lint was introduced; this succeeded completely, but it was not without great difficulty that it could be kept in its place; involuntary expulsatory efforts tended incessantly to displace it, and actually did so several times. This hemorrhage weakened the patient very much, and would undoubtedly have been fatal if it had not been arrested so promptly; in a short time the cure of the patient was completed.

Case 3. The banker, whose case we have just considered, had a brother at Berlin, who had almost the same symptoms; this person heard of his brother's cure, and wrote to M. Dupuytren. After the report of a celebrated surgeon of Berlin, who attended him, M. Dupuytren was quite convinced of the existence of similar internal hemorrhoids, and recommended

excision. But the accident that happened to the first brother had suggested to him a means of effectually stopping the hemorrhage, and, consequently, of obviating the greatest danger attendant on this operation. He gave written directions, and advised cauterization, with a *cauterie en haricot*, if the hemorrhage manifested itself. The surgeon at Berlin did not follow these directions; immediately after the operation he quitted the patient. Not long after his departure, symptoms of internal hemorrhage presented themselves; the patient became faint, pale, and covered with cold perspiration. One of his younger brothers, who had been present at the first operation, discovered the cause of the malady, and sent after the surgeon immediately, but was unable to find him; time was lost, and the danger was imminent; this young brother had the presence of mind to introduce the bladder, as he had seen it done, into the anus, and stuff it with lint, and succeeded in stopping the hemorrhage, but the loss of blood was so great that the patient was a long time before he recovered.

Case 4. A broker, the father of a numerous family, suffered for some years from internal and external hemorrhoids, by which he was more and more incommoded; he was in such a state as to be unable to walk more than sixty paces without stopping to lean against a stone stud, to gain a momentary relief from his sufferings. Finding that he was obliged to give up his business, and wishing at any price to preserve the power of providing for the wants of his children, he came to M. Dupuytren, who examined him, and perceived a double hemorrhoidal tumor, being in every way two inches and a half in diameter; blood and pus were discharged frequently, and the schirrous disorganization appeared very great. M. Dupuytren proposed excision to him. Some fatal cases which recently happened under other surgeons, having made a great noise, and this man having heard of them, the proposal made him shudder. M. Dupuytren had great trouble to convince him that cauterization of the vessels was sufficient to obviate

all fatal consequences. At length the patient consented to allow the operation; but he wished to go to Hotel Dieu, as he would be better watched, and in order that at the first appearance the hemorrhage might be combated. The excision was made, some of the vessels were cauterized, and on the twelfth day the patient was perfectly cured.

Case 5. M. Ex—, a Scotchman, a cavalry officer in the service of the king of England, unmarried, about forty years of age, of a sanguine temperament, experienced, for more than three years, great sufferings, caused by internal hemorrhoidal tumors, which protruded on the least attempt to go to stool. As the fatigues of his profession considerably augmented the annoyance, he came to Paris to consult M. Dupuytren.

In compliance with his advice, he went into a *Maison de Santé*, where he was operated on by this celebrated surgeon, in the following manner:—The patient lay on his side, and made efforts as if at stool; the upper thigh was raised up by an assistant: the operator seized each tumor with a large indented forceps, and with a very sharp curved scissors, excised them successively. There were three tumors, not very voluminous, and as there was but a trifling effusion of blood, M. Dupuytren thought that cauterization might be dispensed with. An assistant was charged to remain with the patient, who was perfectly calm. About five hours after the excision, all the characteristic symptoms of hemorrhage in the rectum were manifested; anxiety, rigors, inclination to vomit, cold perspiration, sinking of the pulse, convulsive contraction of the limbs, inexplicable agony, vertigo, syncope; tenesmus increasing, the patient went to stool, and the expulsion of a considerable quantity of partly coagulated blood gave him visible relief. A cold enema was administered, as M. Dupuytren had directed in such cases; it was returned immediately, and replaced by another that was retained longer. Nevertheless, at the expiration of about an hour, the symptoms returned with increased intensity; they produced complete

collapse. The patient requested a notary should be sent for, and hastened to arrange his affairs, preferring death, which he thought was inevitable, rather than submit to cauterization. Dr. Caillard and Dr. Marx took the responsibility on themselves; they endeavored to tranquillize him; and it may readily be imagined that it was not easy to cauterize under these circumstances. With the aid of a *speculum*, the place from whence the blood flowed was easily found, and the effusion stopped by the application of a bent *cauterie en haricot*, heated to a white heat. The hemorrhage ceased; the alarming symptoms were dissipated; the inflammation which results from the cauterization, and the dysuria that usually accompanies it, yielded very soon to the use of cataplasms, enemata and baths; a wick was kept in the rectum, and at the end of a few days the patient was perfectly cured.

Case 6. Mr. Joseph Cur, of Polish origin, a singer at Amsterdam, forty-eight years of age, for several years suffered great pain in expelling the fœces. This difficulty was caused by internal hemorrhoids, which altogether were about the size of a hen's egg. During the act of defecation they protruded, and caused a very painful strangulation, which was difficult to reduce.

These tumors were not accompanied by habitual nor periodical discharges, only when the patient was constipated; the hardened excrements, occasioned by their pressure an erosion that gave rise to a slight discharge of blood. Forced by his profession to long standing, and to exertions of voice that augmented his disease and his sufferings, he resolved to travel to Paris, in hopes of being cured. M. Dupuytren made him go into a *Maison de Santé*, where, two days after, he was operated on. The patient lay in a convenient posture; the tumors, three in number, being protruded, were immediately excised. What is remarkable in this case, is, that notwithstanding the large volume of the tumors, the excision caused but a slight effusion of blood, and did not require the cautery.

A year after, we had occasion to see this patient, when there was no failure in the success obtained with an astonishing promptitude.

Case 7. A man about forty-seven years of age, of low stature and sanguine temperament, came to Hotel Dieu, to be treated for internal and external hemorrhoids, with which he had been afflicted for fifteen years. These tumors were so painful that he could not take much exercise, or run for any distance, without causing protrusion of the internal hemorrhoids, which became irritated immediately by the friction of the dress. Repeated inflammation caused a discharge, sometimes sanguine, sometimes purulent, sometimes both one and the other. The act of defecation was a continual torture to the unhappy patient. Should the fear of those accidents that may result from the excision induce us to leave the patient a prey to this disastrous infirmity? The frequent returns of inflammation of the hemorrhoidal tubercles will bring on disorganization. Besides, it is almost certain that the sanguine and purulent discharges would undermine the patient's constitution, and the sufferings he would undergo would hasten this fatal termination. We did not hesitate; the operation was decided on, for the danger was not inevitable, whilst disorganization would produce certain death. The patient was prepared for the operation by every means likely to insure success. General bleeding was practised, in order to prevent the violence of the inflammation which usually follows the excision of hemorrhoids. A blister was applied to the arm, to prevent the danger which sometimes follows the too sudden suppression of a natural discharge. The patient was kept on low diet, and the day before the operation the intestinal canal was emptied by an aperient. A tumor, composed of seven or eight tubercles, brownish on the outside, but of a brighter color inside, encircled externally the verge of the rectum. When the patient was lying down, without making any effort, all the tubercles were grouped, so as to form a brownish rugged

tumor, about the size of a large walnut. When, on the contrary, the patient contracted the abdominal muscles, or strained as if at stool, the external tumor opened and exposed a second circular hemorrhoid, also composed of seven or eight tubercles, but of a different color, for they were uniformly of a roseate color, and covered in all their extent by the internal membrane of the rectum.

After pointing out these different circumstances, M. Dupuytren ordered the patient to lie down on his abdomen, and to make efforts as if at stool. This caused the protrusion of the internal hemorrhoids, which were seized with a dissecting forceps, and each of the tubercles that composed it were excised. The same was done with the external tumor, and immediately after, a cautery, heated to a white heat, was applied to the bleeding parts of the wound; some hours after, a small wick spread with cerate was introduced into the anus. He could retain it but a very short time. During the day he complained of transient colic pains, (diet, diluting drink, &c.)

The next day the colic pains were more violent and more prolonged, the verge of the anus was tumefied and painful, the patient felt difficulty in voiding urine, feverish symptoms, (bled in the arm, diluting drink, &c.) The third, fourth, fifth and sixth days after the operation, the pain decreased, the urine was freely evacuated, and the feverish symptoms disappeared; the appetite returned, and he was allowed some nourishment.

The seventh day, as the patient had not been at stool from the day of the operation, an ounce of castor-oil was administered to him, and some hours after, the bowels were opened; five or six stools occurred during the day, they were all accompanied by great pain at the anus; nevertheless, after each of them, the patient felt considerable relief. The following day he went freely and naturally to stool, the colic pains became less and less frequent, but the twelfth day they returned with violence, and were followed by diarrhea, the cause of which

was unknown, (mucilaginous drinks, &c.) The next day he was in the same state, (theriaca, one ounce.) The fourteenth day the diarrhea ceased, and with it the colic pains, (rice gruel.)

On the fifteenth day the patient was quite well. He was allowed a moderate portion of food, he was radically cured of the hemorrhoids, and the anus remained free in whatever posture he placed himself; defecation caused no pain, and he left the hospital, completely cured.

ARTICLE XI.

OF NERVOUS DELIRIUM.

AN operation is performed with dexterity: the attendants are astonished with the surgeon's skill, and yet the patient's life is threatened with very dangerous symptoms: sometimes a violent inflammation appears in the limb operated upon, or in some internal organ, and carries off the patient at the moment when complete success is promised; sometimes pus is absorbed, which is indicated by shivers and fever, the cause of which is generally beyond all the resources of art: sometimes the nervous system is irritated and painful spasms occur, which often become a fatal tetanus; or finally the cerebrum, irritated by pain, fear, and even joy, receives sensations which have no longer a relation with surrounding objects, and the patient loses his reason just when it is most necessary. It is to symptoms of the latter class, said M. Dupuytren, that I now wish to direct your attention. *Nervous delirium* is obscure in its

causes, variable in its progress, frightful in its symptoms, but it is rarely fatal, when timely treated by appropriate remedies. Before entering into remarks on this subject, we will mention several cases of this fatal attendant on wounds and operations, in order that the reader may have a more exact idea of it.

Case 1. Dec. 5, 1831, a man was brought to Hotel Dieu, whose leg had been broken in a quarrel at a café. The fractured limb appeared very much disordered, the upper fragment of bone had lacerated the soft parts, and made a triangular wound in the skin. The fracture was reduced, but the patient continued to cry out during the whole night; the next morning, at the visit, he seemed stupid; during the dressing he again cried out. M. Dupuytren remarked upon this want of courage, or this excessive sensibility in the patient, as an unfavorable circumstance, which was frequently followed by severe symptoms. He was bled three times: the next morning he seemed a little better: but the third day he was delirious: his ideas were incoherent and confused. It was the day that the parents of the patients are permitted to visit them. They often receive on this day forbidden food, or experience relapses, and their disease is generally increased during the evening or night. Did the change in the patient depend on this cause or on others? It was mentioned that he was extremely anxious in respect to a money affair, that he had been very much mortified, in fact that he was constantly saying that his stay in the hospital had ruined him. Leeches, a narcotic and a glyster of assafoetida were prescribed, but with no effect, and on the morning of the ninth the patient died. The death of this person started several important questions: Did he die from some internal inflammation, which frequently arises from fever and delirium? or from the fracture, or a serious injury of the nervous system?

On the other hand, a legal inquiry had been instituted, and M. Dupuytren was called upon to say, whether the fracture was the effect of the fall during the contest in which the indi-

vidual had been engaged, or whether it was caused directly by kicks upon the leg?

At the autopsy which occurred the next day, M. Dupuytren observed, first, that it was extremely difficult to conceive how a man could experience such a fracture, falling only his length: that in the case before us, the thing did not seem probable, and that if not absolutely impossible, the concurrence of certain circumstances was necessary, which were very far from taking place. On the other hand a fracture of this kind might result from a great many different causes, as falling from the first floor, the passage of a wheel of a vehicle over the leg, &c. We can conceive then that it was impossible to decide how this had been caused. The professor took this opportunity of stating how reservedly we should act in reports of a legal character.

The examination of the fractured limb showed that the parts had been bruised violently: the tibia was separated into several fragments, the fibula had been divided, the soft parts were contused and lacerated, and the pleura of the left side contained considerable blood. The cerebrum was healthy.

Case 2. M. R. C., merchant, aged twenty-five years, of a nervous, lymphatic temperament, and with but little moral force, was operated on by M. Dupuytren for a large sarcocele. Being very fearful of hemorrhage, he was extremely restless the day after the operation, which increased his natural indolence. The next day his agitation increased, he was constantly in motion, made gestures, and talked loudly: the least sensation increased his alarms. He however grew better; but soon complained of pains in the limbs and chest: his eyes were bright; his breathing was hurried; he demanded food, and wished to rise. His reason was deranged, he repulsed his nurses and called loudly for his family who were far away from him. His whole body was in motion. His cries, his brilliant eyes, his motionless pupils, his face bathed in sweat, his pulse calm and regular amid all this derangement, indicated

to M. Dupuytren, a nervous delirium. The patient complained of very severe pains in the chest, but the most careful examination showed no disease. The professor prescribed the medicine which he has used in similar cases with so much success, viz. : a glyster with six drops of laudanum, which was administered immediately ; some friends who were alarmed by the symptoms were sent away, and M. Dupuytren ordered the patient to be left entirely alone. One hour after the remedy was administered, M. R. S. ceased to talk, and slept till the next day, his reason undisturbed. In twenty-four days he was completely cured.

Case 3. Langlois, a mason, twenty-six years old, entered at Hotel Dieu, in May, for a fractured rib, caused by falling from the second story. His body was closely enveloped in a bandage in order to keep the thorax perfectly immovable, a condition necessary to the cure. The facility of curing these kinds of fractures is so great that but little attention was paid to him : but the third day he was affected with delirium, which did not leave him. He was constantly agitated : all the muscles were tense, the eyes brilliant, the skin covered with perspiration : the pulse alone was calm. Langlois imagined he saw images flying in the air : he supposed that physical experiments were made upon his bed, and that this was the case with all the patients in the ward. This idea agitated him very much ; he feared their effect and knew not whether to stay or go. This man, of a sanguine temperament, was bled, but he was not calmed ; an enema with ten drops of laudanum was administered, which produced a slight repose. The next day the dose was doubled, but with no more effect. His cries disturbed his neighbors, and the noise in the ward and the visits rendering him still more restless, he was placed by himself. The dose of laudanum was increased to forty drops. The medicine affected him this time, and the delirium subsided. We can imagine how injurious to this man, was so long an agitation in a case where repose and rest are the only effica-

cious remedies. The pleura, irritated by the asperities of the fractured rib, inflamed, the lung became diseased; cough and bloody expectoration proved that he was affected with an intense peripneumony, which was more serious, because the exciting cause was constantly acting whenever he tried to cough. This patient was treated by blood-letting, emollient drinks and revulsives. He seemed to convalesce, but he did not recover entirely: he lost his color and did not regain his strength. He coughed often, suffered from oppression and fever, and when he left the hospital, after remaining two months, he seemed affected with chronic pneumonia.

Case 4. Vincent Francois, aged thirty-two years, chasseur in the third regiment of the Garde Royale, of a nervous temperament, being implicated in a political affair, resolved to destroy himself. He drank to intoxication, entered the church of Notre Dame and there cut his throat. The skin was divided from one angle of the jaw to the other: anteriorly some muscles were cut, and the instrument penetrated into the pharynx, between the hyoid bone and the thyroid cartilage. The wound was dressed and the patient guarded. The second day he was affected with delirium, which presented nothing remarkable, but prevented his cure. He was confined in a straight jacket, and M. Dupuytren prescribed for him a narcotic draught, with half an ounce of syrup of diacodium, which produced but little effect. Finally his reason returned; but his exertions for twenty-four hours caused bad symptoms. He experienced some pain and a feeling of strangulation, and was also afflicted with a violent cough attended with a puriform expectoration. The fourth day the wound assumed a bad appearance, and the seventh day the delirium returned. It was treated successfully by the same means. These symptoms, and some others, excited fears for the man's safety; he however was cured after fifty days of treatment.

Case 5. L. Le N., aged thirty-five years, barber, having squandered in a short time the fruits of many years earnings,

became very melancholy. The loss of his place added to his despair, and in a moment of anger he inflicted on himself seven wounds with scissors, three of which seemed to have penetrated more deeply than the others. He was immediately brought to Hotel Dieu, bled, and put upon the use of a ptisan of tilia, and a soothing potion with laudanum: the delirium was not diminished: the second day, he was again bled, but the patient's health was not improved: he believed himself pursued by the police and attempted to escape; he was obliged to be tied. Notwithstanding this state of agitation, the pulse was not quickened, the tongue was clean: the body was covered with an abundant perspiration, the appetite good: but Le N. would not eat, being constantly tormented by his idea of the police. For two days the patient remained in the same state, although he was again bled, and antispasmodics were administered. The fifth day, M. Dupuytren prescribed two enemata with ten drops of laudanum in each. This remedy was administered and the delirium subsided, and in six days it disappeared entirely, from the effect of enemata. Fifteen days after, Le N. returned to Hotel Dieu, having attempted suicide again. The number of the blows of scissors was so great that they resembled incisions made by scarificators. Nervous delirium supervened, it was treated and cured by administering laudanum in enemata.

Case 6. Marianne R., fifty-eight years old, perceived that her sight was failing. When sixty-one, she could only distinguish day from night. She entered at Hotel Dieu, and the crystalline lenses were perfectly opaque. She was in a favorable state for the operation, and M. Dupuytren performed it by keratonixis, after a preparatory treatment of fourteen days, the common period.

During the day, she vomited frequently, but this was checked by antispasmodic draughts, and ceased the next day. The third day, there was headache, hot tears: four foot baths and two enemata were prescribed. The next day, very in-

tense inflammation of the eyes and eyelids appeared. A portion of the cataract reascended behind the right pupil, and there formed an opaque half moon. On the left, the pupil assumed a square form, and behind it the parts of the crystalline lens and of its membrane, appeared of a very bright red, other parts of the same body were in the anterior chamber : the patient could see no longer, severe pains followed. (Seton in the neck.)

In the night of the fifteenth day, the nervous delirium was very intense, and the straight jacket was required. The next day, the patient knew the nurses, but complained of pretended bad treatment, and gave irrational answers, (antispasmodics, sinapisms to the legs) ; no improvement. The eighteenth day, a quart of enema with eight drops of laudanum was administered—there was drowsiness in the evening. The eighteenth day, delirium appeared again, a quart of enema with ten drops of laudanum was given ; the nineteenth day she was rational, and continued so.

Here terminates the case as to the present subject now before us. We will add, however, that after divers affections of the sight, this patient left the hospital in a satisfactory condition.

Case 7. Stephen M., fifty-four years old, being intoxicated and wishing to step down from a stone seven or eight inches high, placed his foot on it in such a manner that the half only of the plantar face rested on it, while the other half passed over the edge ; hence he fell on the left side.

He could not raise himself, but was carried to Hotel Dieu, where the house surgeon discovered all the symptoms of a fracture of the lower extremity of the fibula, with a fracture of the internal malleolus at its base. He merely put the limb in the common bandage for fractures of the leg : the pain was very severe, and there was swelling around the joint. The next day, M. Dupuytren applied his dressings and resolvents. The third day the pains ceased, the swelling diminished. The fourth day a violent delirium supervened, and the patient

required the straight jacket ; an enema was given with eight or ten drops of laudanum ; the next day the delirium had disappeared, and the use of the medicine was discontinued. The sixth day, the delirium returned and continued till the eighth day, but was finally removed by the repeated administration of glysters with laudanum.

This complication did not retard the cure of the fracture, notwithstanding the inconsiderate motions of the patient. In thirty-six days, the fracture was perfectly united, and the limb was straight.

These particular cases naturally lead us to the history of this complication of fractures and operations, termed by M. Dupuytren *nervous delirium* ; otherwise called according to the cause which produces it, *traumatic delirium*.

It appears sometimes marked by gestures, disorderly motions, and by incoherent proposals, generally uttered in a rapid and thoughtless manner in individuals placed often in very favorable conditions : their ideas are then very much confused, in regard to places, persons and things. Tormented with watchfulness, there is some prominent idea which is generally connected with their profession, passions, tastes, age or sex. They are constantly in motion : the upper parts of the body are covered with a profuse sweat : the eyes become brilliant and injected ; the face is animated and colored, and they utter constantly threats and frightful cries. These patients are often so insensible to pain, that individuals affected with comminuted fractures of the lower extremities, have torn off their bandages and walked upon their broken limbs ; others in whom the ribs are fractured, move about and sing, without manifesting the slightest suffering : finally, some in whom the operation for hernia has been performed, have introduced their fingers into the wound and coolly amused themselves by turning over their intestines, as if they performed this operation on a dead body.

Notwithstanding the severity of these symptoms, the pulse is tranquil and calm, and experiences no alterations, except

those caused by the disordered motions: there is no fever: the excretory functions are performed with their usual regularity, but the appetite fails, and in two, four, or five days, this affection terminates; sometimes the patient dies, sometimes and more frequently, he recovers. If this happy termination is about to occur, reason returns without any apparent crisis, and as quickly as the disease commenced. Overcome by fatigue, a deep and tranquil sleep restores the patient, and in ten or fifteen hours, he awakes perfectly rational, with no recollection of the past, feeble, and sensible to pain: the appetite returns, and the primitive disease pursues its course. This delirium may return two or three times, after a day or two of remission, but is more slight at each return.

The most curious symptom in this derangement of the reason, is the calm of the circulation and the absence of all febrile symptoms. You see a patient furious, his countenance bathed in sweat; his eyes sparkle, his cries are loud; you believe him a prey to the most violent delirium: you approach him: his pulse is calm and regular, and the skin shows no symptoms of inflammation. It is a real mania, which differs only in its duration: it rarely continues more than five or six days.

Nervous individuals of weak characters, those whose brains have been excited by a strong and vivid resolution, are the most exposed to this delirium. Thus it is very frequent in those who have attempted suicide, and occurs so often, that some have asserted it was peculiar to them. Athletic persons are not exempt from it.

Females are less subject to it than males. It has never been observed in children.

Nervous delirium may become very dangerous of itself. M. Dupuytren has seen a young man of a stout constitution, in whom it supervened, merely in consequence of an excoriation of the toes; he died in forty-eight hours, although the excoriation did not seem to be fatal. In most cases, however, the professor estimates the severity of the delirium by that of the dis-

eases which attend it. Thus a fatal termination is much more to be feared, when it supervenes after a fracture of the bones of the extremity, or of the chest, or after extensive wounds of the neck, than when it succeeds simple wounds, and which in themselves are not dangerous.

On inspection of the body, we never see in the cerebro-spinal apparatus, nor even in the other organs, any material lesions, to explain the symptoms during life, or to account satisfactorily for death.

Opiates of every kind, and in every form, bleeding ad deliquium, revulsives, and all other modes which M. Dupuytren has employed, and seen employed for a long time, have always appeared inefficacious in this disease, as they neither diminish its severity, nor arrest its progress. Narcotics, liquid laudanum of Sydenham, when introduced into the stomach, do not produce the most favorable effects. It is easy to explain this want of action by a physiological reason. The stomach is destined to elaborate the first element of nutrition, and it possesses a digestive power, and contains juices which more or less change the substances with which they are in contact: many medicines introduced into the stomach have no effect, because they are mixed with the food: hence why so many of them, particularly of the vegetable family, are so inefficacious, and often of no effect in a multitude of cases.

The uselessness of these different agents, the knowledge of the modifications which medicines undergo in the stomach, have led M. Dupuytren to employ a mode of treatment which has constantly succeeded, and which he considers almost as a specific. This mode, as simple as it is energetic, consists in administering a few drops of laudanum in a glyster. Five or six drops in a quart of fluid, exhibited as an enema, produce more effect than three times this dose introduced into the stomach. The reason of this is known: but we may add that the rectum, destined to be the reservoir of the residuum of digestion, absorbs and does not digest: and we can easily

conceive that medicines introduced into it, when they are not expelled, can fulfil their purpose better. These glysters should be repeated two, three, or four times, every six hours. When retained they will check the most furious delirium.

ARTICLE XII.

FALSE ANEURISMS OF THE BRACHIAL ARTERY.

VENESECTION is generally considered to be too simple an operation to merit particular attention. This view of the subject results from the contempt into which minor surgery has fallen. This also, said M. Dupuytren, is the cause of the accidents which we have seen so frequently for twelve or fifteen years. The hospitals are crowded with people who neglect venesection, and the courses are followed by a still greater number of young men who are permitted to practise without having ever performed it. How often in the hospital wards and in the city, are five or six incisions made in the skin before the vein is opened: it is to this want of skill that we must ascribe the inflammations which frequently supervene, and also the great number of cases of phlebitis, which are now so common, but were formerly so rare. The bad condition and dirtiness of the instrument, often also cause these unfortunate terminations. Finally, it is to the forgetfulness of the first principles, that we must refer those veno-arterial diffused circumscribed aneurisms, to which we have so frequently invited your attention. You have already seen, continued the professor, two individuals operated upon and cured of these aneurisms, at the close of the

year 1831; we shall certainly have an opportunity of showing you new cases of it during this year. I can truly say that for fifteen years, I have been consulted at least twice a year for cases of this kind: if the same thing happens in the practice of other surgeons, you can judge of the frequency of these lesions. A few simple precautions would prevent them; we should lay down as a principle, first, that venesection should never be performed before feeling the pulsations of the artery: second, that the vein situated before this vessel, ought never to be opened: third, finally, that other veins should always be selected. It is true that they are sometimes difficult to find, that we do not succeed in obtaining as much blood as we wish from them, but these inconveniences are trivial in comparison with the bad symptoms we shall mention. I was very glad, said M. Dupuytren, to recall them to your attention before speaking of the subject of this lecture.

Custom has applied the term of *false aneurism*, to designate a disease or tumor formed by blood contained either in the arterial sheath, or in the laminar tissue surrounding the arteries. Sometimes the disease shows itself directly after venesection, sometimes the aneurism does not appear till some time after. We distinguish two kinds of it, one the *primitive* or *diffused*, the other, the *consecutive* or *circumscribed*; differences depending on the period and the manner in which the blood is effused from the artery. There are other differences founded on the parts forming the aneurismal cyst: they belong to the false consecutive aneurism. Sometimes the parietes of the sac are formed by the surrounding cellular tissue. The laminae of this organic element, separated by the blood which extravasates slowly or drop by drop, join, and form a cavity which varies in size, which opens by a hole into the wounded artery. In other cases, the arterial sheath is cicatrized by the employment of a compress, while the edges of the wounds of the internal tissue are separated or remain in contact, but are not united by a solid cicatrix. When the compression is removed,

the lateral efforts of the blood raise the filamentous sheath, separate it from the fibrous tunic, and form it into a cyst. Again, the edges of the arterial wound are united by a newly formed membrane produced by the exhalation of an albuminous matter. We find recorded cases of arterial wounds, which, for some time, have been obliterated by a small clot, the circumference of which corresponded to the edges of the wound, its base to the sheath and surrounding tissue, its summit to the column of blood. This clot being displaced, either by the motion of the limb, or by the impulse communicated to the blood, the circumscribed false aneurism was formed. M. Dupuytren, and several other able surgeons in our times, have seen patients affected with false sacciform aneurisms, the cure of which had been attempted by the method of Anel; the operation having been unsuccessful, some submitted to a second; one of them less fortunate lost his arm.

True aneurisms of the brachial artery, in the bend of the elbow, are very rare; the case reported in the clinic of Pelletan, seems to be the only authentic one known. The two cases of Paletta and Plajani, related by Scarpa, are not sufficiently exact: this is true of those of Saviard and Hodgson.

This is not the case with the false, primitive, or consecutive aneurisms occupying this region. The want of skill, and the carelessness of those who bleed, frequently occasions a wound of this artery, as we have already mentioned: for a long time no other aneurisms were known. Galen, Celsus, and Ætæus, have described them, as also the mode of cure. It is astonishing that operations of this character have been performed frequently without eliciting the laws of the general circulation. Long after this grand discovery, the course of the blood was unknown, even when the arterial trunks were tied. It was not till Heister's time that the anastomoses were admitted. Before this the cure was explained by supposing the existence of a second brachial artery. Sharp particularly, laid down this opinion as a fact; but soon after, Molinelli, in the acts of

Bologna, and Charles With indicated precisely the agents of the collateral circulation. At a later period, the injection of a limb where the brachial artery was spontaneously obliterated, gave Pelletan the opportunity of demonstrating the anastomotic channels. Within half a century, great improvements have been made in this part of science. Now all is foreseen and arrested, and the modern surgeon proceeds in a well known track.

One of the most common causes of the false aneurism of the brachial artery, is as we have said, the lesion of this vessel, in performing venesection. This accident is frequently caused by carelessness. We have seen some patients, in whom the artery deceived so much by its superficial situation, its size, apparent color, the rising of the skin, &c., that the operator did not doubt in the least that it was a vein situated very favorably, and was about to open it, when he happily remembered the wise precepts which M. Dupuytren has taught for many years. On touching this vessel, the pulsation was soon felt. The vein was situated a little more deeply on its sides. Every vein, said the professor, which is situated near, and in the same direction with an artery, must be respected. Messrs. Sanson and Begin, in their excellent treatise on *operative medicine*, have asserted that we should *very seldom* bleed in the course of artery. I say that the vein should never be opened in this place. How many times have I opposed practitioners who wished to bleed over the brachial artery? I have always taught that it could be performed in all the veins in the bend of the arm, except this. Whenever these are not apparent, we must recur to those of the fore-arm, and even of the hand.

The brachial artery may be injured by the lancet in various ways: sometimes the instrument meets the artery and the vein, in a point where these vessels are not exactly in juxtaposition; hence there is an effusion of blood. Sometimes they communicate by the wound, and a *veno-arterial* aneu-

rism, termed also a *varicose* aneurism, forms, because the vein is then dilated by the blood of the artery. This species differs essentially from all others which may be produced by the same cause.

The remarks which have been made were suggested to M. Dupuytren, by the case of a patient who lately came to the public consultation: his history was as follows.

Case 1.—*False consecutive aneurism of the brachial artery, in consequence of venesection.*

A man about forty years old, of a good constitution, was bled about two months since, by a midwife. She opened the vein and the brachial artery at the same time. The blood issued out with force, and to some distance: its color was ruddy. Generally, observed the professor, the stream from the vein does not extend more than one or two feet, and rarely as far as three feet. But when the artery has been opened, the flow of blood is much more rapid, and sometimes it jets forth five or six feet, and often stains the opposite wall. The manner in which the blood flows, is also a character which throws some light on the injury; it comes out by successive leaps, which is unlike the continuous flow of the venous blood, at least at first. This peculiar flow of the blood, however, may depend on the position of the vein directly upon the artery. In this case, the motions of the latter are communicated to the vein, and at first view we might suppose it had been opened. Several years since, M. Dupuytren was sent for in haste, by a distinguished physician, who had just bled one of his patients. On seeing the blood issue forth by successive jets, he thought the artery was wounded. M. Dupuytren saw instantly the cause of the mistake; but the physician persisted in his opinion, and still believes that the artery was opened. In the individual whose case we are stating, it would seem that the midwife perceived the accident, for she compressed the wound very much, by graduated compresses and a tight bandage. The patient felt a numbness, and there was a swelling

of the fore-arm and hand, arising, probably, from the action of the bandage; he also observed the existence of a broad ecchymosis, produced by the effusion of blood into the cellular tissue, but there was no tumor formed immediately. The opening of the artery, according to all appearances, was very small, and the compression approximated its edges. About three weeks after, the aneurismal tumor began to develop itself. It appeared as a small tumor, which evidently had the motion of enlargement and contraction, analogous to the pulsation of the arteries. In about four weeks, it was as large as a pigeon's egg. On examining it, we discovered that half of it was prominent, the other half concealed in the arm.

But, it may be asked, how was this tumor developed? When an artery has been wounded by an instrument, as by a lancet, if it be compressed its edges are approximated; but when this compression ceases, and the patient moves the arm, the effort of the blood separates the lips of the wound, the fluid is infiltrated, pushes the laminae of the cellular tissue, which become thick and finally form a pouch: the latter enlarges and communicates by a small opening with the artery. This, in fact, is what had occurred in this patient: the blood was first compressed; he then made an effort, a pouch then formed which soon enlarged, and the characters of an aneurism were manifested. If you now examine the tumor attentively, you will see that it contracts and dilates alternately. The finger placed upon its tip, alternately rises and falls. If the arm be flexed, the motions become very apparent: if the fore-arm be strongly extended on the arm, these motions are much less marked. It was formerly thought that these two signs infallibly denoted an aneurism: but we know now, that they may be produced by a tumor near or over an artery, and that the suspension of these motions, by compression, is not a positive sign of it. In continuing the examination of the patient, we find that the tumor rises in a point, and that the skin on the top is very thin. If inflammation should super-

vene in this place, we fear that the skin would become still thinner, would open, and that hemorrhage would supervene either externally or internally, which would rapidly destroy the patient. To prevent so fatal a termination, we must employ a prompt and powerful remedy. Compression has already been made, and without success; further, this process requires much time, and may cause gangrene. But here it is inapplicable on account of the thinness of the skin. We must then have recourse to the ligature. But how shall we perform the operation? It would certainly be the surest way to apply two ligatures, one above, the other below the wound; because we should thus avoid the communications which sometimes occur, when the method of Anel is employed: but this operation is attended with several inconveniences. In fact, after suspending the circulation by compression, we must divide the skin on the course of the tumor, open the sac, empty it, seek the opening in the artery, which is not always easily found, and tie it without including the nerve, which is always difficult, on account of the hemorrhage from all the vessels near. Supposing even, that the operation has been perfectly successful, we have made in the skin an extensive wound, which may cause an abscess.

We have said that the discharge of blood impeded the operation very much: this consideration is important enough to detain us for a few moments. When any operation is performed, we are generally sure to suspend the course of the arterial blood by compression; but this is not the case with the venous blood. The reason of this is simple, the compression is made upon one vessel only: in the second it must be made upon numerous different branches.

If, then, the ligature of the two ends of the artery, although more certain, is tedious, painful and frequently very difficult; we must necessarily follow the method already mentioned, and tie the artery above the tumor. This mode is less inconvenient than the former, for we avoid the infiltration of blood, and

most of the obstacles we have mentioned. This method, also, is that employed in most cases ; but I must add, said the professor, that when it is applied to arterial parts which communicate extensively with each other, it fails. This is observed in the aneurisms of the carotid artery and its divisions : a ligature placed below the tumor suspends the pulsations in it at first, but they soon reappear ; the same thing may happen in an aneurism in the bend of the arm.

We must here state why we have made a distinction between simple aneurisms, and those we have termed veno-arterial: the reason is, that in the former, a ligature according to the method of Anel arrests pulsations, while it does not produce the same effect in the second.

We are now determined, said M. Dupuytren, on the mode of operation to be employed : but before performing it, we will describe the part which is the seat of the disease. The region of the arm includes a certain number of superimposed layers, which present themselves in the following manner ; in proceeding from the skin towards the humerus, we find a minute envelope, and a cellulo-fatty layer, through which pass a great number of lymphatic vessels, of superficial veins and nerves. A third layer, common to the whole arm, is formed by the brachial aponeurosis ; more deeply are three sheaths, the external and superior of which, and the posterior, belong to different muscles : the third, the anterior, which is particularly important, is common to the biceps, which is superficial, to the coraco-brachialis, and brachiiæus internus muscles, which are situated below : between them is the external cutaneous nerve, which passes through the upper part of the coraco-brachialis. At its outer and lower part, this sheath contains the trunk of the radial nerve and an arterial branch : at its inner part, on the contrary, it encloses in its whole extent the humeral artery, with its two attending veins, and the median nerve, the relations of which with these vessels are highly important : high up, this nerve is *external*, in the centre it is *anterior*,

and below it is *internal*. This position of the median nerve, which is triply variable in respect to the artery, ought to be noted. Thus, then, above, we must look for the artery on the inside of the median, and on the outside of the ulnar nerve: in the centre, we must carefully avoid seizing the median nerve, which the artery crosses, passing sometimes before, sometimes behind: below, we must always look for it on the outside of this nerve: the ulnar nerve has no longer any relation with it. The lesion or ligature of this nerve would cause a numbness or paralysis of the limb.

In order to tie the artery rapidly, a very important precept to be remembered, is the manner in which it is adapted in every part to the inner edge of the biceps muscle, placed in its sheath. Thus, on opening this sheath towards its inner part, we readily see the brachial artery in the relations indicated with the median nerve.

Having thus mentioned the anatomical arrangement of the parts, M. Dupuytren proceeded to the operation: the patient was laid horizontally on a bed, the affected limb was semi-flexed: an incision three inches long was made at the lower and inner part of the arm: the skin, the cellular tissue and the aponeurosis were successively divided: a small arterial twig was opened. Arrived under the sheath of the vessel, the operator seized it with the forceps, raised it, and opened it with a bistoury. The opening in the cellular sheath being enlarged for two or three lines, with a bistoury guided by a director, he glided under the vessel the extremity of the flexible silver sound. On this sound, he passed a needle with a ligature. In order to prevent the injury of the nerves and veins which accompany the artery, the aneurismal needle must always be passed between it and these organs. M. Dupuytren at first drew the ligature moderately tight, the pulsations ceased, he then loosened it, and the pulsations again occurred. Certain, then, that the wounded vessel was included in the ligature, he tied it with a single knot. The wound was cleansed, and its

edges brought together with a bandage. He recommended that it should not be finally dressed, until we were certain that the small vessel would not bleed. During the whole operation, the patient did not cry out, which proved that the nerves were untouched; farther, the professor wisely took the precaution, which he never neglects, of showing the patient an individual perfectly cured by a similar operation. This ligature, although properly applied, made M. Dupuytren a little anxious. The calibre of the artery was small, and possibly there were two brachial arteries, which he has observed in one case: communications might exist between the upper and the lower end of the vessel: finally, the vein was very large and tense; but as this arrangement did not depend on compression, there was reason to fear that a small narrow opening existed between the artery and the vein. The operation presented no trace of this communication. For two days, compression was exercised by means of compresses arranged pyramidically; the dressings were then raised to examine the tumor; it was slightly diminished, and there was not the least pulsation. Five days afterward, the wound was almost re-united, except in the part through which the thread would pass. Every thing indicated that the operation would be successful, and that the patient would be cured.

Case 2. A pedlar, about thirty-two years old, of a strong phlegmatic constitution, was bled for a violent head-ache, and the brachial artery of the right side was opened at the same time with the vein. The surgeon discovered the accident by the color of the blood, by its jets, which were alternately stronger and weaker: the blood was allowed to run till fainting occurred. He then exercised compression to prevent a new hemorrhage, and enjoined upon the patient to continue it, but concealed the injury. The wound of the lancet cicatrized, and the patient, thinking he had nothing to fear, discontinued the compression: a tumor appeared in the bend of the arm, and increased daily.

When the patient entered at Hotel Dieu, this tumor was as large as the fist; it was round, even, fluctuating, and presented motions isochronous with the pulses. These motions were very perceptible during the flexion of the limb, and ceased entirely when it was extended. Compression above the tumor caused them to disappear: when applied below, it rendered them stronger and more apparent. The conclusions from these facts were, first, that the opening of the artery was small: second, that this opening, and that of the aneurismal sac, were not parallel: third, that the tumor received blood from only one channel: fourth, that most of the blood contained in the sac was coagulated, and consequently that compression properly made, would perhaps cure it. This compression was employed and favored by the action of ice: but as this mode produced no sensible benefit, the wishes of the patient were complied with, and the operation was determined on.

He was seated in a chair, in the middle of the amphitheatre, and opposite the spectators. His arm was extended outward, and held in this position by assistants. M. Dupuytren placed himself at the back part of the limb, in order that the students might follow the different periods of the operation: he then ascertained the position of the artery, and made an incision two inches long, about two inches above the tumor: divided slowly the skin, the subcutaneous cellular tissue, the brachial aponeurosis, the inner edge of the biceps, and then came to the cellular sheath which contained the artery and the nerves. This sheath was gradually divided by a director, and the artery was separated from the median nerve, to which it was contiguous. This part of the operation lasted only a few minutes, but the patient was now faint: the pulsations of the heart were slower, and those of the artery ceased entirely. A mistake was feared; and for more than fifteen minutes, M. Dupuytren hesitated between the nerve and the artery; the circulation, however, was soon re-established; and he then perceived, as well as several of those around him, that the body

he had separated was really the humeral artery: a ligature was passed under it, and before tying it, he satisfied himself, by raising it, that it caused the pulsations to cease in the tumor, and that the patient felt no pain. The lips of the wound were united by adhesive plaster: a simple dressing of a perforated linen band spread with cerate, lint, compresses, and a bandage were applied: the patient was carried to bed, and the tumor covered with ice.

In the evening, the skin of the limb resumed its normal temperature, and the first night passed well; the patient complained only of pricking in his fingers. The next day, the pulsations were felt in the radial artery, and afterwards ceased, but returned again. The application of the ice was continued.

The fifth day, the dressings were removed: an erysipelas existed, which extended the following days to the arm and fore-arm. The ice was discontinued: the erysipelas was treated by the application of three blisters to the most inflamed parts: by the aid of this treatment, the erysipelas disappeared in a few days. The eighth day the tumor opened, and a mixture of pus and blood were discharged. This discharge continued for several days. The tenth day, the ligature was removed, and no hemorrhage supervened. The fifteenth day, the different openings in the aneurismal sac, were enlarged by an incision. The clots contained in the tumor were removed: during the day hemorrhage supervened, and the wound was plugged.

The following days suppuration took place in the tumor; the dressing was removed, and only pus was discharged. From this time the wound diminished daily: that of the ligature cicatrized, and only a small opening, leading to a narrow pouch, the remnant of the aneurismal sac, remained: the motions of the arm and hand were re-established: the patient wrote to his friends, and after about two months of treatment, he left the hospital, perfectly cured.

It will perhaps be asked whether the forced extension of the arm which caused the pulsations of the tumor to disappear, had been continued for a long time and aided by ice and compression, might not have saved the necessity of the operation.

Continual extension would have been very fatiguing and very painful: it might produce ankylosis, which would have been a very serious accident. Ice and compression would doubtless have been successful to a certain extent; but it would have been necessary to employ them for a long time, and these two remedies are not without their danger. The operation which we have described, was adopted by M. Dupuytren in consequence of an examination of the tumor, which removed all ideas of a varicose aneurism. The length of the operation was owing to the fainting and the position in which the patient was placed, in order that the pupils might see all the steps of the operation. M. Dupuytren stood on the outside of the limb, and was obliged to keep himself bent in a very fatiguing posture, which interrupted the promptness and boldness of his motions. The arm being extended horizontally, gave the wound such a position that the blood which flowed from the divided parts coagulated on the deep parts, and tinged them. Hence, remarked the professor, the difficulties which I created for your instruction, ought not to serve as a rule of conduct for you. For this operation the patient should lie upon a high bed, and his arm hanging freely in a state of supination, should be well lighted and easily accessible to the fingers, the eye, and the instruments of the operator.

The circulation being so promptly re-established, led us to fear that the operation would be unsuccessful: the application of the ice prevented the blood from flowing back into the tumor.

M. Dupuytren was the first to point out the phenomena which occur in re-establishing the anastomotic circulation. He has shown that the blood comes below the ligature long before the arterial trunk pulsates. The distention of the vessel and

its elasticity are the first indications of this re-establishment of the circulation. We afterwards perceive a slight murmuring, which is very irregular in respect to force and celerity. It reappears after a greater or less interval, and indicates with certainty the return of the heart's influence. This second phenomenon, which is always regarded as a sure mark of the success of the operation, may however, after a time, disappear. Thus in many cases the professor has known the circulation to be suspended a fortnight, or one, two, or three months after the operation, and gangrene appear in consequence. But it must be observed, that no instance of gangrene is known after tying the brachial artery, when the nerve has not been implicated. The most common accident in these kinds of operations is the re-establishment of the circulation in the tumor; when this occurs, the two ends of the artery must be tied. The erysipelas which supervened in our patient deserves to be noticed: the transient blisters, in this case, produced the same good effects they have so often obtained in the hands of M. Dupuytren. We shall make but one more remark on the period of the removal of the ligature: it occurred on the tenth day, while in another patient, operated on at nearly the same time for an aneurism in the crural artery, it did not take place till the twenty-fifth day: we can easily see that the time must vary according to the size of the artery, the degree of pressure produced by the thread, and the greater or less quantity of cellular tissue embraced in the ligature.

Case 3. A young man, twenty-two years old, a pork butcher, was bled by a physician in the median basilic vein; the operator passed partially through it and pricked the artery. Blood of a vermilion red jetted out with extreme force and to a great distance. Perceiving the mistake, he attempted, after taking the necessary quantity of blood, to make pressure on the wounded part methodically. The hemorrhage was at first arrested; but soon returned at different times. Anxious in regard to his situation the patient came to Hotel Dieu, and

was admitted; nine days after the accident, a soft fluctuating tumor, the size of a nut, appeared, presenting pulsations isochronous with those of the pulse, while motions of expansion and contraction existed in the bend of the elbow. By compressing the artery above the tumor, the pulsations ceased: they increased, on the contrary, when the compression was made below it. The existence of an aneurism was then evident. The wound of the vein had cicatrized; there was no indication that this communicated with the artery. The ligature being the most efficacious mode of treating this formidable disease, the operation was performed the next day. The patient laid on a bed, the right arm in supination, an incision two and a half inches was made above the bend in the elbow and on the course of the brachial artery. The subcutaneous cellular tissue was found infiltrated with blood: the fibro-cellular sheath, which enveloped the median nerve and brachial artery, was dense, thick, and easily torn: a very large vein which crossed the incision, was divided. The bundle formed by the artery and the median nerve was exposed. A ligature was passed between these two organs, by means of a director and an aneurismal needle. M. Dupuytren thought that he passed the ligature round the artery only: but on raising the two extremities of the stylet, to be certain that the artery was separated, the patient experienced severe pain, followed by a numbness in the whole course of the nerve. A minute dissection separated it entirely from the artery, on which the ligature was replaced and tied. No pain ensued: the pulsations in the tumor and the circulation in the rest of the forearm instantly ceased. The edges of the wound were brought together and placed in immediate contact, by means of adhesive bands: the thread was placed in one corner; some pledgets of lint and a roller constituted the dressing.

The convalescence of the patient was uninterrupted. The forearm preserved its natural temperature and color. The third day, pulsations in the radial and ulnar arteries began to

be perceptible, but there were none in the tumor. The tenth day the ligature came away and the wound was nearly cicatrized: from one corner however, there was a slight discharge of healthy pus. The nineteenth day the patient was perfectly cured, and well enough to leave the hospital.

This patient's case led to some important remarks of a practical character from M. Dupuytren, and he stated that the ligature of the brachial artery, which is generally considered as simple and easy, may present difficulties. If we regard the readiness with which the nerve and artery are laid bare, this operation may certainly appear easy and quick. But the most important point, and that too which is generally neglected, is to separate these organs completely, and to avoid wounding other vessels which may be in the course of the instrument.

Thus M. Dupuytren, taught by experience the precious advantages of this method, prefers a very minute dissection, and to devote a long time to separating completely the artery from the surrounding nerves, convinced that the quickness of the operation cannot compensate for the severe inconveniences attached to tying them in a mass.

This patient presented a new instance of success obtained in a wound of an artery, by the application of only one ligature between the wound and the heart. All individuals affected with this dangerous injury are far from being as fortunate: and in a great many cases, the surgeon, in order to ensure his patients from all consecutive hemorrhage, is obliged to tie the upper and lower ends of the artery. The following case, which occurred in the private practice of M. Dupuytren, and which he mentioned latterly at his clinic, supports our assertion.

Case 4. An envoy from Brazil recently arrived at Paris, being occupied in his cabinet in making a pen, supported the nib on the left thumb nail to cut it, when the handle of the knife escaped from his right hand. The open blade ascended

several feet into the air and fell perpendicularly on the anterior and external face of the left fore-arm, which rested on his secretary. The point was very sharp, and passed through the skin and subjacent parts, and opened the radial artery. A copious hemorrhage followed; a surgeon was immediately sent for and saw the nature of the injury. Hoping that compression alone would be sufficient for the cure, he made it very methodically by means of graduated compresses, and a roller extending from the extremity of the fingers to above the wound of the artery. This dressing remained in place several days, and there was no hemorrhage; when the bandage was removed, the wound had healed; but an aneurismal tumor had formed; nevertheless, it was thought that compression properly and perseveringly applied, would cure the patient. This hope was unfounded; the tumor not only remained, but increased daily.

M. Dupuytren was sent for, and thought that the radial artery should be tied; the patient consented to it. It was soon done. The ligature was applied to the upper end of the artery; and when it was drawn tightly, the circulation in the aneurismal tumor and in the radial and ulnar arteries ceased; the dressing was then attended to, but it was scarcely finished, before the circulation was re-established in the lower end of the radial and ulnar arteries, and the tumor again presented very distinct pulsations, precisely like those existing before the operation. M. Dupuytren then tied the radial artery below the aneurismal tumor, and the pulsation ceased and did not again return. Fifteen days afterwards the patient was entirely cured by this operation.

Case 5. A wine merchant, forty-five years old, of a good constitution, but subject to hemoptysis, was bled in the arm by a physician: the lancet was withdrawn, and the blood immediately jetted out: a powerful compression was instantly made, but without success: at the end of a month, when the patient came to consult M. Dupuytren, there was an enormous tumor

in the bend of the elbow. The operation was urgent and was soon performed. As soon as the ligature was applied, the pulsations in the tumor ceased: some persons, however, thought there was a slight oscillation in the radial artery. In the night after the operation, the patient had violent hemoptysis, which obliged Dr. Marx to bleed him twice. In fact, not unfrequently after the ligature of a large arterial trunk, signs of plethora and even hemorrhages occur: sometimes there are palpitations, numbness, oppression, sometimes epistaxis, hemoptysis, &c.: these symptoms are generally removed by one or two bleedings. In this man, it was remarked that the pulsations in the radial artery were very rapid, which doubtless depended on the influence of the capillary vessels: but they did not reappear in the tumor. This circumstance must probably be attributed to the existence of a clot between the artery and the tumor. Observation teaches, however, that it is somewhat dangerous for the numerous anastomoses between the two ends of an artery to re-establish the circulation too quickly, because in some cases, this too rapid return of the blood causes new pulsations in the tumor. This was the case with our patient, whose cure was rapid, and who left Hotel Dieu, about four weeks after the operation.

We will conclude this article by a very important remark, to which the professor will doubtless have occasion to recur. In his profound lectures on clinical surgery, M. Dupuytren developed a theory tending to establish that the ligature of the arteries above their lesion, is generally attended with good results when this lesion is recent and the edges of the vessel are in the state of a fresh wound disposed to unite; while this ligature presents much less chance of success when this lesion has been of long standing, and when its edges are cicatrized and consequently incapable of adhesive inflammation. The ligature of the upper end of the artery suffices in the former case, whether the source of the effusion does or does not communicate with the external air; while in the other cases, it is always neces-

sary to tie the two ends of the vessel. There are no exceptions to these rules except when the injured artery is situated at the extremity of a limb : its numerous and varied communications then render the ligature of the arteries indispensable. This important theory explains facts for which it has hitherto been difficult to account.

ARTICLE XIII.

GENERAL REMARKS ON THE TREATMENT OF FRACTURES OF THE EXTREMITIES.

Description of the Bandages, and manner of their application

PERHAPS there is no department in surgery which requires on the part of the practitioner the knowledge of a greater number of details, than fractures generally. In fact, it is not sufficient for him merely to establish their diagnosis, and to apply the means which form the principal base of the treatment : he must also know the course of conduct to be adopted according to their different complications, the nature of the symptoms, and the various circumstances attendant upon the injury. If he be truly scientific, he will not disdain to descend to those things which are commonly considered as too minute and too trivial, but the neglect or forgetfulness of which is nevertheless so often attended with fatal consequences. Thus the precautions to be used in removing the patient's clothes, and in carrying him from place to place, in order to prevent his cruel sufferings, and not to increase the injuries of the soft parts which may exist, the position in which he should be placed, the form,

and the degree of softness or hardness of the bed on which he lies during the treatment, the manner in which we should proceed to dress the fracture, and to apply the bandages, the mode of determining the firmness of the callus, the advice to the patient at this period, have all been seen to be useful, and demand your particular attention. In a remarkable lecture on this subject, M. Dupuytren has presented some very interesting details, the principle of which will be mentioned in describing the apparatus used by him for fractures of the extremities.

M. Dupuytren generally uses the same apparatus for all fractures of the leg and thigh, excepting a fracture of the lower extremity of the fibula.

Whenever the fracture is situated in the thoracic extremity, and there is no wound, the roller bandage is preferred. Some compresses are placed across the limb, as high as the fractured part, and over these, splints of tin, pasteboard or wood.

When the humerus is fractured, the patient is seated on his bed: one, two, or three compresses are applied, over which a few turns with the bandage are taken: other compresses are placed above and below, and then splints are applied upon the four faces of the limb, which should not encroach upon the articular surfaces of the bones. They are kept in place by a bandage.

When the bones of the fore-arm are broken, the necessary dressings are; a band four or five ells long, graduated compresses, two splints as long as or a little longer than the fore-arm, and particularly broader than it.

The patient sits or lies down, the four fingers of the hand are held by an assistant, while another grasps the lower part of the arm: the fore-arm being held a little flexed on the arm, we proceed to the extension. The surgeon presses on the anterior and posterior faces of the fore-arm, crowds the extensor and flexor muscles into the interosseous space, which thus regains its proper size, the fragments of the radius separating from those of the ulna: the four fingers and the metacarpal

bones are then bandaged as far as the wrist: this is then held by an aid: graduated compresses of the proper breadth and soaked in lead water, are applied to the dorsal and palmar faces, and must cover the wrist, the carpus, and the metacarpus. The two splints being applied over them, the bandage of the wrist is taken from the assistant, and the roller bandage is continued on the fore-arm from the wrist to the elbow. The antero-posterior diameter is thus increased, and the interosseous space necessary to the rotatory motions of the fore-arm is thus preserved.

If the fracture of the fore-arm be complicated with a wound, the tailed bandage of Scultet, or one like it, is used.

In the fracture of the radius, M. Dupuytren adds to the common dressing a splint, which he terms the ulnar: it consists of a plate of iron, curved at the lower extremity, and in the concavity of which are several buttons. The upper extremity of this metallic plate is confined to the ulnar edge of the fore-arm. A compress folded several double is placed between the inside of the wrist and the convexity of the splint, to separate them: the hand is then carried towards the splint, embracing the radial edge of the former in a fold formed by a quilted compress, which is placed between the thumb and the base of the index finger, and the two extremities of which are fastened by two linen bands on the splint, being fitted to its button.

When the olecranon process is fractured, M. Dupuytren prefers to the common apparatus the bandage uniting the fracture crosswise: as in the extension of the limb, the upper fragment or the olecranon process, is the only one which tends to get out of place, graduated compresses are placed above this process only. The professor also uses the anterior splint: but that employed by him is straight.

Scultet's bandage is used almost entirely by M. Dupuytren in fractures of the leg and thigh, where the roller bandage can-

not be kept in place for a moment. It is composed of the following pieces :

First, of several pillows : second of several towels : third, of tapes : fourth, of a cloth fanon : fifth, of a tailed bandage : sixth, of transverse compresses : seventh, of longitudinal compresses : eighth, of graduated compresses, in case the bones project : ninth, of a perforated linen smeared with cerate, lint or diachylon, if a wound exist : tenth, of cushions of straw : eleventh, of splints, termed immediate : twelfth, of splints termed mediate : thirteenth, of a body bandage : fourteenth, of a sous-cuisse and a sous-pied. Let us examine the uses of each of these pieces successively.

The pillows are destined to receive the fractured limb : the first advantage is to keep it raised, and prevent all flow of blood or serum : he forms in it a hollow which keeps the limb in place, and prevents it from rolling on the mattress.

The towels are folded several double and are placed on the pillows, in order that these may not be stained by the blood or pus : this precaution is particularly necessary in hospitals, where without it, the pillows dirtied and soaked in pus or blood would soon become sources of infection.

On the cloths are extended the tapes which are designed to fasten all the parts of the apparatus, and to unite the dressings in one. Of these, there are three for the leg, three for the thigh, and six for the leg and thigh. The breadth of the cloth fanon should be equal to the length of the limb, and it should be folded double. It is placed crosswise on the tapes, and is designed to receive the splints on its extremities, and support them. On the cloth fanon are placed the strips of bandage, either united or separated, which form the eighteen-tailed bandage. If a wound exist, and pus or blood is discharged, they should be separated, in order that when soiled, they may be changed separately. This change is easily accomplished, in the following manner. A clean strip is pinned to that which is soiled,

the head of the pin looking towards the limb, in order that this may not be wounded when the soiled bandage is removed; this latter is then withdrawn, and replaced by the new one.

If the fracture be simple, the nine, ten, eleven, or twelve strips are united in the centre, and in such a manner that the first is partly covered by the second, the second by the third, and so on. To apply them, we proceed from below upward, for if we commence at the upper part, the dressing would be wrinkled, which should be carefully avoided. These strips should be long enough to go nearly twice around the limb. The cross compresses which envelop it, are placed the deepest at the most elevated part, and only doubled; for if tripled, it would be more difficult to apply them. They should be as long as the strips of bandage.

If the fracture be compound, and a wound exist, the compresses must be renewed without changing the dressing. In these cases, you observe the advantages of the long compress, which can be removed when it is dirty.

Two, three, four, or more compresses, of various forms, which are generally square, are then applied around the limb.

It is just as well to place the graduated compresses lengthwise or breadthwise on the extremity. If, for instance, the tibia be fractured, and the fragments project outward, they should be placed lengthwise and along the sides: or crosswise, if the upper extremity projects forward.

In these kinds of cases also, the splints I term immedicate, are necessary, because they act directly on the fragments by the medium only of the graduated compresses. These splints should be made of paste-board or light wood; if they were not flexible, they would wound the parts. We must not forget that they should never be placed directly on the fragments of bone without interposing between them and the latter, one or two graduated compresses.

When the whole is thus arranged, we apply the transverse compresses, and then the bands around the limb, being careful to direct them a little obliquely forward, so that they can cover each other.

Then come the mediate splints, rolled on each side in the extremities of the cloth fanon.

Between them and the limb are placed cushions of straw : they should be a little longer than the limb, and five or six inches broad, and an inch and a half or two inches thick. They should be carefully modeled in the form of the limb, diminishing in thickness in those parts which correspond to its convexity, increasing, on the contrary, in those which look to concavity.

The bandage is then united in a single piece by tapes, which are fastened on the outer splint on the side towards the surgeon, and by simple knots.

A sous-pied, made with a long compress, or a sole with strings, which is attached to the sides of the cloth fanon, keeps the foot in one position.

Finally, cradles are placed over the extremity, so as to preserve it from the weight of the bed clothes. But this, in fact, is not all. To prevent the motions of the whole limb, a cloth, folded like a cravat, that is, the two ends folded towards each other, and then the sides folded on these ends, is attached to one side of the bed : the piece next passes over the thigh or the leg, according as one or the other is fractured, and the other extremity is attached to the opposite side of the bed. If the thigh be fractured, we also place around the pelvis a body bandage, which embraces the loins and the upper extremity of the external splint. M. Dupuytren remarked that if this precaution be neglected, and the fracture existed at the upper part or at the neck of the femur, the limb would be crooked.

The bandage, in the manner we have described, is extremely firm, and is not deranged even when the patients are delirious.

Let us add to these details, continued the professor, that the bed on which the patient is placed, ought not to be too soft ; it should be perfectly even ; for if convex, the patient might be displaced : it should be made of hair, or of a firm mattress, and provided with cloths, either to raise the patient, or to prevent the bed from being soiled. Finally, neither his head nor his feet should be elevated.

After describing the pieces which compose the dressings, and the manner of applying them, added the professor, I must call your attention to the situation of the patient directly after the accident. If he be brought upon a litter, he ought not to be hurried from it : he should be undressed there, and his bed should be prepared, and the bandages arranged : the boots and stockings should be cut or torn, to avoid all pain in drawing them off. The limb should be washed, in order not to be obliged to do it in the bed, which might be soiled. These attentions being paid, one assistant lifts the body of the patient, another the limbs, and the operator, or when he is absent, another, takes charge of the fractured limb. In this manner the patient is carefully raised and placed on the bed : the pillow should be but slightly elevated, in order that he may not slide to the foot of the bed, but enough so to prevent the head from falling back, which would expose to congestion of blood.

In order to apply the bandage, the surgeon stands on the outside of the fractured limb : an assistant, placed on the inside, presents successively each part of the dressing. Another aid holds the foot, seizing the anterior part and the instep with the left hand, and grasping the sides of the heel between the thumb and the fingers of the right hand. A third assistant near the knee or thigh, according to the place of the fracture, places his hands on the sides of the condyles of the femur or of the tibia, being careful not to press on the popliteal vessels and nerves : for if the parts were wounded, the pressure would cause hemorrhage. Compresses dipped in Goulard's lotion, or any other resolvent liquid, are held at two extremities by the

surgeon, and the other by the first aid, and spread on the limb; being careful not to wrinkle them. If there be a wound, it is covered either with diachylon, or a compress spread with cerate, and perforated, on which lint is placed. Finally, the different parts of the dressing are arranged successively, as we have stated above.

If no wound exist, we must proceed the next day to a new dressing: for sometimes, said M. Dupuytren, considerable swelling and gangrene supervene in twenty-four hours. From this time the patients are visited every five or six days, if they experience no pain, and more frequently if they do. As to the duration of the treatment, the dressing must generally be kept on from twenty-eight to thirty days in children, forty days in adults, and a much longer time in old people. It should not be removed till the union seems to be perfect.

To be certain of this union, the operator takes hold of the two fragments of the fractured bone, and prudently attempts to perform certain motions: if the callus yields, the bandage should be reapplied immediately: if it resist, it should not be reapplied, but should be left three or four days loose, at the side of the limb.

At this period the patient should not be allowed to walk immediately, for the callus may yield to the weight of the body or to the action of the muscles: he should, therefore lie still in bed, for ten, twelve, or fifteen days. He then should sit upon his bed on a pillow, the foot placed on a cushion, and the limb supported by a roller bandage, for about three weeks. He then should assist himself by crutches, which should be enveloped in cloth, in order that they may not slip. The patient, if possible, should live in the basement story, and should avoid walking on uneven pavements, and should take exercise on level and sandy ground.

I have insisted the more on these minute and apparently common details, said M. Dupuytren, because experience has taught us how important it is for practitioners to know them,

and further, because they are generally badly understood, and still more frequently, also, badly applied.

ARTICLE XIV.

OF FRACTURES OF THE LOWER EXTREMITY OF THE FIBULA, AND LUXATIONS OF THE FOOT.

General Remarks.

OF the two bones of the leg, fractures of the fibula occur less frequently than those of the tibia, although it is weaker and more exposed to external injury. This peculiarity is explained, said M. Dupuytren, by its insulation from the line in which the weight of the body is transmitted to the foot. The elasticity of this bone even in old age, the little weight sustained by most of it, the protection it receives anteriorly from the muscles which fill the interosseous space and even from the tibia, posteriorly from the gastrocnemii and solæus, and on the outside from the peronei muscles, tends to weaken the effect of bruises upon it, and to diminish the number of its fractures. We must remark that many of its lesions have often been mistaken, that others in many cases have been confounded with luxations of the tibiotarsal articulation, so that in fact they are much more frequent than most authors admit. Farther, M. Dupuytren estimates that the fractures of the lower extremity of the fibula alone, are to the rest of the fractures of the bones of the leg, as one to three.

Some of the causes which produce fractures of the fibula, operate directly upon it: others act on it through the medium

of the foot : hence two kinds of fractures : those near the middle and upper extremity of the bone, and fractures of the malleolus : these two kinds of fractures differ in three respects, viz. : their causes, their effects, and the treatment to be employed.

The situation of the body of the fibula on the outside of the leg, the thinness of the bone, the space between it and the tibia near the middle of the leg, the support of its two extremities on the tibia, these facts would induce us to think that fractures of it would occur most frequently in its centre : this, however, is not the case. Two causes diminish the frequency of these fractures : the support which the fibula receives from the peroneus longus and brevis muscles, and the few circumstances which can directly cause a fracture.

These fractures are generally caused by the action of force directly on the bone, and are produced by blows on the fibula, from cutting or bruising bodies, by fire-arms, by the fall of heavy bodies on the outside of the leg, or by these bodies passing over it. They do not suppose and they do not require any muscular power. Hence they generally occur without being usually preceded or followed by any dislocation of the foot, either inward or outward, and in most cases, are cured by rest, and without being attended with any of the bad symptoms which are so frequently complicated with those produced by the dislocation of the foot. These fractures, said M. Dupuytren, are remarkably analogous with those of the ulna, which are seldom caused separately except by forces applied directly to the point upon which they act.

Fractures of the body or upper part of the fibula, when the tibia is uninjured, present no displacement in the direction of the length of the fragments : the foot preserves its normal direction, and we hardly perceive at the place of the fracture, a depression caused by the slight sinking of the bony parts. The diagnosis of injuries of this kind may be somewhat obscure, especially if the swelling has time to develop itself. The circumstances of the injury, the violence of the blow on the leg,

or the weight of the body which bruised the limb; the existence of an extensive ecchymosis, of a deep contusion in the affected region: the ease with which the finger on passing over the external surface of the fibula is depressed in this part, and pushes the extremities of the fragments towards the tibia; such are the principal signs which must serve as a foundation for the surgeon's opinion. The motions of the foot and those attempted to be communicated to the extremities of the bone, are seldom attended with evident crepitation, on account of the thinness of the fragments and the exactness of their relations.

Fractures of the body of the fibula are not attended with shortening of the limb, because the tibia serves as a splint for it. They are rarely serious, except, when complicated with considerable lacerations of the soft parts. In simple cases, nature is almost sufficient for the cure; and the indications, in cases of fracture of the body of the fibula are, to dress properly the contusions and the wounds which may perhaps attend the fracture. The bone generally unites in from thirty to thirty-five days, and the limb is usually straight.

History. But fractures of the malleolar portion of the bone to which we shall now attend are much more dangerous and more serious. For a long time they were confounded with dislocations of the foot. They were first mentioned by J. L. Petit and Duverney, among modern surgeons. Petit particularly remarked, that lateral dislocations of the tibio-tarsal articulations could not occur without the rupture of one of the malleoli. David, Fabre, Broomfield, Pott, Pouteau, Boyer, and Ch. Bell, have since contributed by their remarks, to make us better acquainted with fractures of the lower extremity of the fibula. The history of these injuries, however, was still very imperfect, and the mode of treatment seldom prevented deformity, when M. Dupuytren thought of the subject, and rendered the treatment of this as efficacious as that of other fractures.

Causes. The lower extremity of the fibula may be broken either by direct causes like those mentioned above, or from efforts upon the foot, which produce their effect by a counter-blow. The mechanism of fractures of the first kind, continued the professor, presents nothing remarkable: that of the second, on the contrary, demands the attention of the practitioner, because it is important to know perfectly the circumstances capable of fracturing the fibula, in order to be acquainted, in doubtful cases, with the possibility of the existence of this injury. A clod, a cavity, or simply an inequality of the soil, a fall from a height on the feet inclined inward or outward, these are the most common causes of these fractures: they result directly from the action of the weight of the body and the contraction of the muscles acting quickly on the lower articulation of the leg, at the moment when the foot is carried inward or outward, and separated from the vertical line.

Let us now see by what mechanism fractures of the fibula may be caused by violent motions of the foot inward or outward. It is evident that in these two cases there is a change in the line of the support of the weight of the body, which causes the fracture. In the first case this line, instead of passing through the axis of the tibia as it does generally, and falling on the astragalus, cuts obliquely from within outward the lower extremity of the tibia, the articulation of the foot, and extends to the outside of this limb, after passing through the malleolus of the fibula. The parts upon which the weight of the body falls are then the external malleolus or the lower extremity of the fibula, which yields to the traction of the external lateral ligaments; this traction is much more powerful, as the direction of these ligaments is then almost perpendicular to the malleolus, and as this process rests on the sharp edge of the astragalus, which is also pushed forcibly from within outward by the tibia. This last bone is thicker and stronger than the fibula and usually resists, and if its malleolus be sometimes broken and afterwards wrenched, this fracture does not occur

primitively, but this malleolus, and sometimes the lower extremity of the tibia, are fractured consecutively, and from the displacement of the foot outward.

In the second case, that is, in the motions of the foot outward, the centre of gravity of the body, instead of following the line by which it is generally transmitted to this limb, and thence to the soil, passes obliquely through the lower part of the fibula, the articulation of the foot, the malleolus or the internal lateral ligaments, and falls on the ground more or less distant from the inner edge of the foot. These ligaments, and the malleolus to which they are partially attached, on one part, and the lower extremity of the fibula on the other part, are then the parts which must support the weight of the body and the efforts of the muscles: these also are torn or fractured: first the lateral ligaments or the internal malleolus, and then the lower extremity of the fibula.

Signs. Two orders of signs mark the compound affection of which we are now treating: some belong to the fracture of the fibula, others to the dislocation of the foot: a difference which is abstract, since fracture of the fibula may exist sometimes without dislocation of the foot.

These symptoms are of two kinds, presumptive and characteristic. The presumptive signs, said M. Dupuytren, are the species of accident which happened to the patient; a noise, a kind of cracking heard at the same moment, a constant pain at the lower part of the fibula, difficulty of walking, or even an inability to walk, a greater or less swelling around the articulation of the foot, and particularly around the external malleolus and the lower extremity of the fibula. The characteristic signs are, an unevenness, an unnatural motion in some part of the lower extremity of the fibula, a more or less evident crepitation from motion or pressure, a cross motion of the foot, the ease with which the lower extremity of the fibula can be made to approach the tibia by pushing it, the change in the direction of the axis of the leg on the foot, the

displacement of this latter outward, inward, and sometimes backward, the rotation on its axis from within outward, a more or less marked angular depression at the lower and outer part of the leg, the prominence of the internal malleolus, the disappearance of nearly all these symptoms as soon as we attempt to reduce the foot, and their instant return when these efforts are suspended, and especially when the limb is extended.

Let us now review these signs in detail, and attend particularly to the characteristic symptoms. The fibula is no sooner fractured, than very remarkable phenomena supervene in the tibio-tarsal articulation. The outside of the groove which receives the astragalus, having lost its solidity, no longer resists so strongly the action of those muscles which tend to turn the foot outward, and which are more powerful than their antagonists. The outer edge of the foot then rises, the inner edge is depressed, the dorsal face of the part looks directly upward, and the plantar region is inclined outward. The pulley of the astragalus is directed on the internal malleolus, and sometimes causes a prominence there, which is easily discovered through the integuments: the malleolus of the fibula, on the contrary, has a see-saw motion on the tibia, which raises its summit, and brings the upper extremity of the fragment, near the axis of the limb. The foot is then placed on the outside of the centre of the intermalleolar space: if we extend the axis of the tibia downward, it would fall on the inside of the tarsus, and the weight of the body would be supported by the internal malleolus, and the ligaments attached to it. This displacement of the foot outwards, is the only one necessarily resulting from the fracture of the fibula: and it is the more marked, the lower the fracture, and the more the patient has tried to use the broken limb. Where the fracture is caused by the violent inclination of the foot inward, the action of the muscles soon brings the foot outward, and produces in its relations with the leg the changes mentioned.

If the fracture of the lower part of the fibula is not recognized, or is treated inefficiently, the derangements produced by it become still greater, the action of the muscles gradually draws the foot outward, the astragalus is brought above the internal malleolus, the corresponding ligaments are extended, the distended soft parts inflame and alter, and the synovial capsule being open, caries attacks the articular extremities, and destroys them. In the most favorable cases, the patients, being unable to confide the weight of the body to a deformed, weakened, and painful limb, the extremity of which is the malleolus of the tibia and the inside of the foot, are compelled either to use crutches, or to walk with a wooden leg. M. Dupuytren has amassed a great number of facts, which show the fatal results which attend fractures of the fibula when they have not been recognized.

It is important, then, to determine correctly the diagnosis of these injuries. Whenever an accident which may produce them, has happened, we should carefully examine the lower part of the leg, and the tibio-tarsal articulation. The presumptive signs may doubtless be caused simply by twisting the foot, or when this is attended with rupture of the ligaments: but collaterally they may render the existence of the simple fracture probable. If there be dislocation, we can almost always discover in the part the inequalities produced by the fragments, which are proportional to the extent of the dislocation. In passing with the finger over the whole lower portion of the fibula, we perceive at the fractured part an anormal mobility, which must be distinguished from the elastic flexibility of the bone, and the existence of which is demonstrated by embracing the tibia with the four fingers of each hand, while we press the fractured parts successively with the thumbs. The crepitation is commonly slight, and frequently cannot be perceived. If we grasp the lower part of the leg with one hand, and the tarsus with the other, if the

fibula be fractured, the whole of the foot may be carried alternately inward and outward.

The last motion renders the internal malleolus prominent, separates from the centre of the joint the external malleolus, and removes in a measure the astragalus from the line of the axis of the weight of the body: the other restores all these parts to their natural state. If left to itself, the foot, as we have said above, is inclined outward: the internal malleolus projects considerably: the integuments which cover it are tense and strained, the axis of the leg falls on the inside of the tarsus, instead of corresponding to its centre: the space between the two malleoli is enlarged; on the outside of the joint, the skin is wrinkled transversely: the external malleolus seems pressed down; above and in the fractured part, we commonly observe a sharp depression, the direction of which is before backward, a kind of hatchet cut, as M. Dupuytren terms it, which becomes a pathognomonic sign of the fracture of the bone. This, however, must not be confounded with the depression presented by the fibula above the malleolus, and between the tendons of the peroneus brevis and tertius muscles.

In some patients, the wounding force turns the foot inward so forcibly, that it remains there, notwithstanding the fracture of the fibula: but the upper extremity of the lower fragment then raises and nearly tears the skin; the finger perceives the unevenness of the fracture. After the dislocation is reduced, the phenomena mentioned above appear, and the accident cannot be mistaken. The last symptom is the ease with which all the symptoms reappear, after they have been removed by restoring the foot to its normal direction.

The prognosis of fractures of the lower part of the fibula should be serious, in proportion to the derangement attending them. When simple, and discovered immediately, and treated methodically, they are seldom attended with bad symptoms or with deformity. They become dangerous only when over-

looked through the ignorance of the surgeon, or when they are treated unskilfully.

Species and complications. Fractures of the fibula are divided by the professor into *simple* and *complex*. The fracture is *simple*, when there is a fracture of the bone, and no other derangement. This form is extremely rare. It cannot occur, except at a certain distance from the lower extremity of the fibula, and when the cause which has produced it immediately ceased to act, and has been unable to produce other effects, or still more when another cause consecutive to the first has not occasioned other injuries.

It is very difficult to discover a simple fracture of the fibula. We can have in regard to its existence only the presumptive signs mentioned above.

One of the most common causes why this kind of fracture is seen so seldom, is certainly the exertions made by the patients, directly after the accident, either to walk home or to some adjacent place. Sometimes it has been known to lose its primitive character of simplicity long after the accident, from the imprudence of the patients, who tired of being still, have wished to walk by supporting themselves on the fractured limb. Hence we can imagine how important it is, in cases of this kind, to oblige them to keep perfectly still. This rest and some resolvent applications, are generally sufficient to produce a perfect cure. This kind of fracture presents two varieties. In the first the fibula is fractured more than three inches from the summit of the external malleolus. This is distinguished from all other fractures, inasmuch as the foot is not and cannot be dislocated. This impossibility depends particularly on the length of the lower fragment of the bone, and on the integrity of the tibio-peroneal ligaments. It is generally found in fractures produced by a direct cause, and never in those which occur indirectly. The reason of this is that the latter is always preceded with a more violent motion, and even with a dislocation of the foot either inward or outward. This

variety is never dangerous, and in order to be cured, only requires rest, and that the limb should be kept semiflexed. The second variety embraces all cases where the fibula has been broken directly or indirectly at least three inches from the top of the external malleolus, and the foot is not dislocated. It may occur in any intermediate points, but when the foot has been forcibly thrown outward, it generally occurs two and a half inches from the top of the malleolus, because the fibula is weaker and thinner in this part than in any other, and being curved inward by the weight of the body and the action of the muscles, it presents less resistance. If on the contrary the foot had been flexed inward, the fracture generally occurs below this part, and in that portion of the bone which is lodged in the groove of the tibia. This variety is particularly distinguished from the preceding, by the degree of facility with which the foot may be displaced.

The *complications* of fracture of the fibula are numerous, and render it more serious than it is of itself. If any cause, for instance, produces a violent motion of the foot outward, the efforts of extension and of flexion which fracture the fibula, act first on the soft parts of the inner face of the articulation and the lower extremity of the bone, rupture the internal lateral ligaments, and cause the dislocation or even the fracture of the internal malleolus : or, as the fracture is caused by the motion of the foot inward, and the individual has afterwards attempted to walk and to rest on the foot, the latter will be carried outward, and the same symptoms will occur. Hence a first complication. Sometimes the lower extremity of the tibia is broken, instead of the lateral ligaments and the internal malleolus. This fracture, whether preceded or followed with that of the fibula, is almost always oblique and attended with dislocation of the foot. A third complication which occurs generally, except in cases of simple fracture, which as we have already mentioned are extremely rare, is the dislocation of the foot. This happens in different directions, inward, backward,

outward, and finally outward and upward. The first is so common and is so connected with the existence of fracture of the fibula, that one rarely exists without the other, and it is one of the most certain symptoms of fracture: it consists in the displacement of the head of the astragalus, which is thrown below and on the inside of the malleolus of the tibia; this displacement is only the continued effect of the action of the causes which produced the fracture, or rather a consequence of the action of the abductor muscles of the foot.

The second arises from the action of the gastrocnemii and soleus muscles: the latter act on the foot, which is no longer retained in place by the resistance of the external malleolus, and cause the astragalus to glide from before backward on the lower extremity of the tibia, and the lower end of the fibula to move so that its lower extremity is carried backward, while the other is carried forward.

The third kind of luxation is the rarest and most difficult to explain. The astragalus is then carried from the side and below the peroneal malleolus, while the outer edge of the foot is carried downward, the sole inward, and its inner edge upward: the malleolus of the tibia is concealed and disappears between the foot and the leg, at the base of a re-entering angle on the inside, and the fibular malleolus forms with the astragalus a prominent angle which is rounded outwards. According to these arrangements of the parts, the foot presents the appearance of a congenital club foot. The professor attempting to account for the cause of this extraordinary displacement, examined successively the organization of the lower extremity of the limb, the relative action of the antagonist and balancing powers which govern it, and their effects. First, in a state of rest and of sleep, in club-footed people, and in most false steps and sprains which result from it, the foot being constantly directed inward and the astragalus carried outward, these parts seem to be displaced almost always in the same direction from fractures of the fibula and the lower extremity

of the tibia : and it follows also, from the study of the respective powers of their antagonist muscles, that in most cases the abductors should be, and are in fact more powerful than the adductors : hence we remark, that the outer edge of the foot is generally drawn outward, and the astragalus inward, whether there be a fracture of the malleolus and the lower extremity of the fibula, or of the two malleoli at the same height : finally, when the tibia alone is fractured at its extremity, although the foot has no longer any support on the inside, and preserves on the contrary that which the fibula and malleolus supply to it, nevertheless the astragalus is most generally more or less evidently displaced inward, which cannot be attributed except to this superiority of the abductors over their antagonists. From all these considerations, said the professor, we must necessarily conclude that the dislocation of the foot outwards, (in which the astragalus is carried outward and the foot inwards) cannot arise, except from peculiar, unusual, and very rare arrangements. Reason and observation have taught him, that these arrangements consist in the obliquity of the fracture of the tibia, and in the greater or less resistance of the lower fragment of the fibula, the obliquity of the first, influencing the direction in which this displacement is made and the muscles which produce it : the resistance of the second, preventing the foot from going outward, and consequently favoring the action of the abductors.

The last kind of dislocation of the foot, outward and upward, which has never been mentioned, has been seen but once by M. Dupuytren in twenty-five years practice, and in more than two hundred cases of fracture of the fibula which he has treated. But it has been characterized in such a manner, that its possibility cannot be doubted, nor can it be mistaken : in this species, the astragalus is at first dislocated outward, and then ascends on the outer face of the tibia. In the instance mentioned by the professor, the astragalus, the external malleolus and the foot, were carried first on the outside of the leg, and

were then raised in an entire mass two inches along the tibia, as in the natural state of parts firmly articulated with each other. We can then imagine that it will not occur without fracture of the fibula and complete laceration of the tibio-peroneal ligaments.

If the fibula be fractured in several parts and in several directions at once, which happens particularly when it has been crushed by a violent blow, or by the passage of the wheel of a vehicle over the lower and outer part of the leg, there is a laceration and destruction of the soft parts, the nerves, tendons, aponeuroses, and the skin, and consequently, the patient is affected with pain, inflammation, abscesses, eschars, convulsive motions, tetanic spasms, &c., which actually endanger his life, and render the treatment long and difficult.

But although this species of complication is very serious, it is not to be compared with that frequently caused by internal derangements which are concealed from the sight by the skin. These are sometimes so great, that we should almost despair of relieving them, had not experience taught that they may be cured perfectly, completely, and in a little time. Thus the tibia and fibula are fractured singly or together, in one or more parts, with numerous sharp cutting spiculæ depressed into the flesh; the articulation may be opened and its cavity filled with blood mixed with synovia: the internal lateral, the tibio-peroneal, and the external lateral ligaments may be ruptured unevenly: the tendinous grooves of the muscles may be open: the tendons and the nerves distended, twisted, compressed, displaced, and partially or entirely divided: the arteries and the veins, particularly the internal saphena vein, compressed, ruptured, and surrounded by effused blood: the cellular tissue may be torn in every direction and filled with reddish serum, and more frequently also with blood which is infiltrated to the toes below, and to the knees above. If we add to these accidents the various displacements, to which the bones are exposed, we shall have a slight picture of the disorders which so frequently attend fractures of this kind.

The arteries or veins may be injured alone, and independent of the formidable injuries mentioned above, and may give rise to an infiltration of blood into the meshes of the cellular tissue, or to an effusion of this fluid into sacs of various sizes, formed from the ruptured cellular tissue, which separate the soft parts, surround the fragments of the bones, extend around the articulation, and sometimes penetrate within it. This kind of injury constitutes a new species of complication, and further, one of the most common of fractures generally, and especially of those of the fibula; it deserves to be particularly distinguished on account of the severe symptoms it causes, and the proper mode of treating it.

Very commonly the skin has been removed and lacerated in one or more places by the ends of the fractured bone: these openings are generally irregular, with ragged, torn, and disorganized edges; sometimes they embrace the bone, sometimes they are open and give passage to blackish blood, or folds of flesh and half destroyed tendons project from them. They are produced in several ways, either primitively as we have mentioned, or consecutively from inflammations, from the removal of eschars, from a process of elimination established by nature to expel the blood, the pus, and all other disorganized parts. These lesions of the integuments are another kind of complication so serious in its effects, said the professor, that fractures which are otherwise not very severe, may become extremely dangerous, although we ought never to despair of the cure of these internal injuries, however extensive they may be, provided the skin is sound. Those produced directly by the fracture are the most dangerous, on account of the violent consecutive inflammation, and the pains, abscesses and necroses, and numerous other symptoms which result from the formation and the infiltration of pus.

The swelling, tension and strangulation which follow fractures are different degrees of the same complication, and the result of the fluxion made upon the nervous and fibrous parts

which are distended or lacerated by the bones, and the displacements which they have undergone. When these symptoms are not discussed at the commencement, the tumefaction and the swelling may become very intense and dangerous in a few hours : here and there are phlyctenæ filled with reddish serum ; the limb becomes livid, cold and insensible, and if the disease be not arrested at this period, strangulation takes place : the extreme distention of the external parts and the no less violent compression of the internal parts cause gangrene, and a part or the whole of the limb mortifies. These phenomena are perfectly developed before any marks of inflammation are seen, which circumstance doubtless depends on the rapidity with which it takes place. But in other cases, the fluxion mentioned above is followed with inflammation, which then assumes two different forms : sometimes the symptoms progressively increase : the pain, redness, heat, tumefaction and tension, the local and general fever, exist in the greatest degree, and are followed as in the preceding case with numbness, lividity and icy coldness of the limb, with cessation of pain, which pleases those who are ignorant of the cause, and with gangrene. The skin, or the cellular tissue, tendons, nerves, ligaments, and sometimes the whole foot, mortify. Sometimes this inflammation appears in the form of a slight phlegmonous erysipelas, the progress of which is slow : but after a few days, the symptoms increase, the fever becomes intense, the tongue dry, diarrhea supervenes : we soon begin to perceive here and there an obscure fluctuation, the crepitation of elastic fluids : we remark phlyctenæ : under them form eschars which open, and a mixture of pus and elastic fluid is discharged. The subcutaneous cellular tissue mortifies : the skin peels off in a greater or less extent ; a slow fever exists, the strength fails, and the patient exhausted by the fever, by the suppuration, or the diarrhea, dies in a greater or less length of time.

The displacement of the bones, the wound, the laceration, and the distention of the parts, cause, and keep up a perma-

nent secondary pain, which is increased by the inflammation and its attendant symptoms, is accompanied with fever, watchfulness, agitation, and may, by its intensity, or from the peculiar sensibility of the patient, or on account of his constitution, cause even convulsions and tetanus. The former symptoms generally disappear as if by magic, as soon as the fracture is reduced ; according to the old adage, *sublatâ causâ*, &c. But the tetanus, when once manifested, resists the most energetical treatment, and amputation even rarely arrests its effects. One complication of fractures of the fibula, and of surgical diseases generally, is too common and too important to be passed over in silence : we allude to *nervous delirium*. We have devoted an article, the eleventh, exclusively to this affection.

If from the effect of the laceration or the destruction of the flesh, the bone is exposed directly to the air, or if the inflammation and the suppuration have destroyed the vitality of the spiculæ, or have detached from them the periosteum which nourishes them, these spiculæ die, and hence necrosis of these bones, another complication of fractures of the fibula. Nevertheless, this necrosis of the fragments of the fractured fibula is rare, but on the contrary, very common in the tendons of the lower extremity of the leg. It is because the tendons are also more exposed to the disorders produced by the fractures. It does not manifest itself immediately ; but some time after :—Then appear pain, redness, heat, swelling, tension, and an obscure fluctuation in the course of the affected tendons : the skin becomes thinner and opens : pus escapes through these openings, filaments come from it, and are replaced until every part destroyed by the necrosis has been removed. Finally, a last and frequent complication of fractures of the fibula, when they are followed by inflammation, is an adynamic affection, which according as it is true or false, essential or symptomatic, requires such a different course of treatment, that the patient's life frequently depends on the proper distinction being made.

Treatment. Perhaps there is no surgical disease, the treat-

ment of which has hitherto been more uncertain and generally more inefficacious, than that of fractures of the fibula, attended with dislocation of the foot. There is, however, no one which, on account of its frequency and the severity of the symptoms attending it, requires more imperiously a determinate mode of treatment, certain in its results, and founded on principles sanctioned by experience. This defect in the treatment depended on two causes; one which we shall call theoretical, may be ascribed to the imperfect ideas on the respective arrangement and uses of the great number of organs which form the lower extremity of the limb, and on the mechanism of the causes which produce this fracture and this dislocation. The second, which may be considered as a consequence of the first, was the imperfection of the modes of reduction and especially of the apparatus used to keep the reduced parts in perfect relation with each other. In fact, if we compare the old methods with the mode of action of the moving powers of the limb, we shall see that none of these methods is capable of keeping the reduction perfect. Pott, the only surgeon before M. Dupuytren who has stated the manner of reducing it easily and without efforts, has indicated no mode of continuing the reduction. The number of failures resulting from the preceding causes, was also greatly increased by the erroneous opinions on the mode of reduction according to the nature of the complication. M. Dupuytren has re-modelled this theory, has established the gentle and easy process of Pott for the reduction on its true basis, and invented a method as certain in its effects as it is precious in its results, for keeping the reduced parts in their exact relations until they are firmly united. This was the foundation, the greatest difficulty to be conquered, and in which no one before him had completely succeeded. We shall see by explaining his mode of treatment and the results of his practice, how much the science owes to this celebrated surgeon, and what immense services he has rendered to humanity.

Cure. If we consider the fracture in itself and abstractly,

the first and only indication to be fulfilled is, to prevent all displacement of the fragments. Rest and immobility will frequently accomplish this, and produce a cure whenever there is a simple fracture, whether it occurs at more or less than three inches from the lower end of the fibula. These modes, added to the reduction, will also be sufficient if the fracture be complicated with a simple dislocation of the foot, in whatever direction it may occur; and they should be immediately used, if we wish to prevent the accidents and deformities which result from them. But there was a question which it was important to solve, because the safety of the patients depend, in a great many cases, on the manner in which it is considered. Is there any complication of fracture of the fibula, which contra-indicates its reduction? All the symptoms which we have mentioned above are the immediate effects of the powers which have produced the fracture, or the consecutive effect of the fracture itself. M. Dupuytren proceeds on this principle, which conforms to the nature of things and to observation, viz.: that in both cases, the symptoms are aggravated and become more intense by the cause which has produced them, and that they must become more serious the longer this cause acts; he therefore admits, as a general rule, that the surest and quickest mode of arresting them is to reduce the parts at all periods of the disease. This was also the opinion of Desault, who reduced the parts when the most violent inflammatory symptoms existed, but the apparatus which he employed for the dressing cannot be proposed as a model.

Reduction. There is no reduction, said M. Dupuytren, which can be accomplished more easily than that of fractures of the fibula attended with dislocation of the foot, when we have discovered the mode of overcoming the resistance of the muscles. The obstacles arising from this resistance, have exercised the talents of surgeons from Hippocrates to our days. In order to attain this, we have merely to flex the leg on the thigh, and distract the attention of the patient. The muscles

soon lose their tension, the resistance ceases as if by enchantment, and the parts resume their natural situation and relations almost without effort. However exact the reduction performed in this manner may be, it is always imperfect, the fragments of the bone remain depressed on the side of the tibia, the foot tends continually to yield to the action of the peronei muscles and to go outward. We must then require some mode to raise the fragments, separate them from the tibia, and place them nearly opposite each other. What is this mode? It is impossible to act on the upper fragment which is never depressed, and which, on the contrary, is generally prominent: hence we must act on the lower, and consequently through the medium of the foot; now the latter is connected with the malleoli so intimately, that when it is drawn forcibly on one side, one of them is crowded upward, and the other drawn downward in the same proportion. Hence we conceive that the lower fragment of the fibula may be raised by pulling it obliquely, that is, by exercising upon the foot forcibly the motion of adduction. The external lateral ligaments being unable to extend except to a certain point, act upon this fragment more forcibly, the more the inner edge of the foot is carried inward. In this manner, the lower extremity of the tibia is depressed deeply in the joint, the astragalus is pushed from within outward, the lower fragment of the fibula has a see-saw motion upon it in a contrary direction to that of its displacement, and thus resumes its position under the upper fragment.

Mode of keeping the parts reduced. It is evident that the position which rendered the reduction of the fracture so easy, by relaxing the muscles, is also the first mode to be used to keep the parts reduced. But we can imagine it would be imprudent thus to leave a fractured limb to itself, and that the bones must be kept together by a dressing until the callus has formed and become solid. This dressing should be modified more or less, according to the kind of dislocation attending the fracture.

A cushion, a splint, and two bandages compose all which M. Dupuytren has used so successfully for more than twenty-five years, in fracture of the fibula attended with dislocation inward. The cushion is made of cloth and two-thirds filled with straw: it should be two and a half feet long, four or five inches broad, and three or four thick. The splint should be from eighteen to twenty inches long, two and a half inches broad, and from three to four lines thick, and should be made of thick and stiff wood. Finally, the two bandages should be made of worn linen, and should be from four to five ells long.

The cushion, folded in the form of a wedge, is applied to the inside of the fractured limb and extended on the tibia, its base directed downward and resting on the internal malleolus, but not extending beyond it, its summit upward, and on the inner condyle of the tibia. The splint applied along the cushion must pass five or six inches below it, and extend three or four inches below the inner edge of the foot. These first parts of the dressing should be attached to the upper part of the leg, by a few turns in the bandage directed from above downward.

In this state, the splint is extended beyond the base of the cushion, and leaves between it and the foot a space equal to the thickness of the cushion, that is, from three to four inches: this extremity of the splint will serve as a point of support to bring the foot from without inward. In order to do this, we attach to it the end of a second band, which is then carried successively from the splint to the upper face of the foot, to its outer edge, under the sole, on the splint, then from this on the ankle and under the heel, then again on the splint, which is continued in the same manner until the whole bandage is used. By thus embracing within the same turns of bandage, which is shortened at pleasure, the splint and the heel alternately, the foot is placed in such a state of adduction that its outer edge becomes the lower, the sole is directed inward, and its inner edge looks upward. But as the foot yields to the action of this apparatus, the tibia pressed by the base of the

wedge formed by the cushion, and on which the whole apparatus is supported, is pushed outward, as is also the astragalus. The lower fragment of the fibula being carried upward by the tibia and downward by the external lateral ligaments, has a see-saw motion on the outer edge of the astragalus, as we have already mentioned, by which it is brought to its natural situation. The professor remarked that if we wish the reduction to be complete, we must not merely bring the foot under the leg, but continuing the efforts at reduction, the dressing should bring it as much inward, as it was carried outward by the fracture.

This apparatus, besides the advantage of reducing the parts without effort and almost without pain, and of keeping them reduced, presents another, which is of great value. It leaves between the bandages a considerable space, where we can see the articulation and the fractured part, and can apply all the topical remedies, which the primitive or consecutive complications may require.

The same apparatus is also suitable in all cases of fractures, with simple *dislocation* of the foot *outward*. In order that it may be applied to a *dislocation outward and upward*, it must be placed on the outside, that is, along the fibula, instead of inside or along the tibia.

But cases of *dislocation backward* present many more difficulties than the preceding, both in reducing the parts, and in keeping them reduced. In the first case, the difficulties arise from the resistance of the muscles to the lengthening of the parts, and the re-establishment of their natural relations: in the second case, the upper face of the astragalus, which is convex from behind forward, is so slippery, that it is very difficult for the tibia to rest evenly upon the pulley of this bone, and it tends constantly to go forward, while the astragalus being continually acted upon by the extensor muscles of the foot, which are more powerful than the flexors, tends continually to go behind the lower extremity of the tibia. This double action must be resisted, if we wish to cure the patient without

deformity. We owe to M. Dupuytren the discovery of a mode of treating this fracture, which consists simply in a modification of the apparatus we have described, and its mode of applying it.

To the parts enumerated, we add a small cushion a few inches square, filled with hair or straw. The large cushion, also, is folded in a wedge form, and laid on the posterior parts of the leg, and extended from the heel to the calf of the leg, its base downward, and summit upward. On this cushion, we apply the splint, which is attached by a band to the upper part of the leg; a second band embraces the lower extremity of the leg and of the splint: this is the active part of the apparatus. The small cushion is destined to cover the tibia, to keep it from being compressed by the bandage. The latter, in resting on the splint and the tibia, carries the heel forward, and the tibia backward, by the same effort. The power of this mode is such, that we have to fear it may be too great.

Fractures complicated with dislocation of the foot inward and backward, are most generally cured by the treatment of that of the two displacements which predominates. In the contrary case, it is easy to combine the two apparatuses which we have described, so as to fulfil this double indication.

In support of the principles which we have stated, we shall mention the history of some cases which will serve still more to make known the most remarkable symptoms of this disease, and the most prominent results of the treatment.

Case 1. *Presence of presumptive signs. Subsequent development of the characteristic symptoms.* M. D. was walking on a narrow causeway, when the earth rolling from under his left foot, the body lost its support on this side: a rapid motion brought its weight on the right leg: but the rolling of the earth continuing, the body glided on the slope of the causeway into a ditch, and he fell on the inside of the right leg, which was bent and in a state of semiflexion. A sharp

pain was felt at the moment of falling : the patient could not rise. He was carried home without having made any exertion, any attempt at walking, and did not rest at all upon the painful limb.

M. Dupuytren was sent for nine or ten hours after the accident, and found the foot and the leg in their natural relations. The foot presented no trace of unnatural mobility from one side to the other, nor the malleoli the least indication of a fracture. The patient did not suffer in the state of semiflexion which he had chosen instinctively, nor in the motions of the foot which he had attempted, nor from the examination made by the professor. He, however, could not bear upon his foot ever so lightly, without feeling a severe pain above the external malleolus : and the finger, if rested upon this part, produced pain, the patient cried out, and withdrew his limb. There was an ecchymosis, which extended upward along the fibula, and downward around and below the external malleolus to the corresponding side of the foot. But there was no sensible mobility or crepitation, nor dislocation of the foot outward nor backward, the only characteristic signs of fracture of the fibula. The professor, however, thought that the bone was broken, but that there was no displacement, and ordered that the limb should be kept in a state of semiflexion, and that resolvents and repose, which are also indicated in a simple sprain or contusion, should be applied.

After a few days, at the instigation of a friend, the patient neglected the advice of M. Dupuytren, and rose, taking care hardly to touch the earth with the injured foot, and experienced but slight pain. Emboldened by this attempt, he ventured still farther the next day, and tried to support his body on the limb. He had no sooner made the dangerous attempt, than he felt a sharp pain, attended with a cracking and laceration : he fell, and was unable to rise. When called again, the professor found a dislocation of the foot outward, with mobility and crepitation. He applied the apparatus

which we have described, and the patient was perfectly cured in six weeks, notwithstanding some inflammatory symptoms, which, however, disappeared without suppuration.

Case 2. Fracture. Dislocation of the foot inward. Severe symptoms. Treatment by the new method. Perfect cure without deformity. John Trouille, twenty-six years old, a porter, slipped upon a moist and greasy pavement and fell on his right side, the foot in a state of adduction, and the leg flexed under the body. At the same moment he felt a severe pain at the bottom of the leg and tried to rise: not being able to walk, he was carried home, and the next day was brought to Hotel Dieu.

Symptoms. Dislocation of the foot outwards, so that the axis of the leg, extended below the lower extremity of the fibula, instead of falling on the astragalus, falls on the outside of it and the whole breadth of the tarsus: rotation of the foot on its axis, by which the inner edge looks downward, the plantar face outward, its outer edge and its dorsal face upward: considerable prominence of the tibia and the internal malleolus; opposite the latter, an extreme tension of the skin, and phlyctenæ filled with reddish serum. On the opposite side a very deep depression, and a transverse folding of the skin, two inches above the external malleolus: sudden disappearance of all the symptoms at the slightest attempt at reduction, and spontaneous return of them as soon as it is suspended. Besides a very extreme pain near the lower part of the fibula; an unevenness, mobility, crepitation, sensible displacement of the fragments, and so great facility of carrying the foot cross-wise, that one would think the malleoli and their ligaments destroyed: all incontestable marks of a fracture of the fibula with dislocation of the foot inward.

Accidents. Very strongly marked ecchymosis, extending from the point of the fracture, and from the internal malleolus on the corresponding faces of the foot and leg; considerable tension and swelling around the articulation; severe pains,

which are moderated by bringing the foot to its natural direction. The surgeon of the ward merely applied a cataplasm; the next day an edematous puffiness of the flesh had increased the tumefaction and the tension. M. Dupuytren reduced it, and kept the parts in place by his apparatus. There was fever: he prescribed venesection, diluent drinks, an opiate and rest.

The third day, the pain ceased, the patient slept during the night, but the swelling continued: he attributed it to the tightness of the bandages, and these were loosened: the fourth day, the same swelling existed, there were darting pains, redness, heat near the external malleolus, and continued fever; leeches were applied along the fibula: the fifth day fluctuation was observed in the centre of the ecchymosis with fever: leeches were again applied; the sixth day, the tension and swelling diminished; there was less of fever, but the fluctuation was more apparent: a solution of acetate of lead was applied; the seventh day, there was some improvement, but the discoloration of the parts showed a vast abscess filled with liquid and fluctuating matter, which extended from near the head of the fibula towards the place of the fracture. It was thought to be filled with effused blood: the same wash was applied with a small quantity of camphorated spirits as a stimulant: the ninth day, the limb had improved: the absorption of the blood seemed to have commenced. The tenth day, the patient inconsiderately moved the limb, and the dressing was displaced; the limb rested on the folds of a tumbled towel: hence there were pains, deep impressions in the skin, phlyctenæ in different parts, and fever: the thirteenth, all the symptoms were less, and superficial ulcerations appeared in the place of the phlyctenæ: the swelling had nearly disappeared, and showed that the internal malleolus had been fractured at its base: it was now evident, that the blood had been absorbed: the extent of the abscess was one third less: the fifteenth day, the limb was fatigued by its position, and rested alternately on the inner and the

outer side. The fortieth day, the fracture had united : there was no deformity ; the apparatus was removed : the sixtieth day, the convalescence was perfect.

Case 3. *Simultaneous fracture of the lower extremities of the fibula and tibia. Very severe symptoms. Treatment by the new method. Cure with very slight deformity.* F. C. Michel, forty-eight years old, while going down stairs, had the foot suddenly thrown outward, which was attended with severe pain at the lower and outer part of the leg. The limb which was thrown outward, rested partly on the external malleolus on one side, and on the knee on the other, and had to support the whole weight of the body, and caused a new pain which was much more severe than the other, at its lower and inner part. The patient was carried to Hotel Dieu immediately.

There existed pain, swelling, unnatural mobility, crepitation : and further, first, dislocation of the foot outward, with ecchymosis, mobility, and evident crepitation at the lower and outer parts of the leg : the characteristics of a fracture of the fibula : second, displacement of the foot backward, extension of this part on the leg, a prominence an inch and a half from the articulation, formed by a flute-shaped fragment, and belonging to the body of the tibia ; third, finally displacement of the lower extremity of this bone backwards, which had attended the foot in this motion : evident fracture of the tibia.

The house surgeon merely reduced the limb, and dressed it with the common apparatus for fractured legs. A very painful inflammation supervened, and phlyctenæ appeared. The next day the effects of the reduction disappeared. M. Dupuytren again reduced it, applied his apparatus, covered the parts with sedative resolvers, and prescribed venesection, and cool drinks.

The third day, the pains were mitigated, the progress of the swelling was arrested : the phlyctenæ were covered with cerate. The fourth and fifth days, the suppuration of the

phlyctenæ began to diminish; the prominence of the upper fragment of the tibia appearing to increase, the foot and the lower fragment were pushed forward. The eighth day, eschars appeared in the prominence of the upper fragment of the tibia, and opposite the fracture of the fibula: the patient was restless, some tonic drinks were given. The twelfth day, the swelling had diminished, the eschars began to be detached, the bones were not denuded, but the extensor tendons were exposed. The thirteenth day, the pus under the skin was expelled by gentle pressure and methodical compresses: the dressing of the fracture was removed. The sixteenth day, the double displacement of the foot outward and backward again appeared, and the fragments again project: the apparatus was reapplied, and a sous-pied was added to bring the lower fragment of the tibia under the upper fragment.

From the sixteenth to the twentieth day, the dressings were changed twice in twenty-four hours; to do this it was merely necessary to remove the bandage applied around the foot and the lower extremity of the splint. From the twentieth to the twenty-fourth day, notwithstanding every care, the pus burrowed forward between the tibia and the fibula: an abscess appeared in front of and below the fracture of the former: the twenty-sixth day, the abscess opened and pus was discharged: the thirty-first, the new skin had formed, the swelling was nearly discussed, and the leg was in a very good state.

The fortieth and the following days, there were pains on the outside of the leg opposite to the fracture of the fibula, which were attributed to the weight of the limb, and the pressure upon the remnant of the wound. The apparatus was removed, and the limb was laid on the opposite side. The forty-fifth day, the foot was again displaced outward and backward, and the union was not yet perfect. The forty-seventh day, the apparatus was reapplied as on the sixteenth

day ; from the forty-seventh day to the fiftieth, the flexion of the foot became painful : it was diminished.

The sixty-sixth day, the exfoliation of the extensor tendons which had been long preparing, took place : the callus seemed to be solid ; the apparatus was removed and replaced by splints of pasteboard, extended on the faces of the limb, and kept in place with a roller bandage.

Sixty-ninth day. The foot still seems displaced : the apparatus was applied for the third time and kept on for forty successive days : it was removed on the one hundred and tenth day, when the callus seemed perfectly solid.

Some time after, the patient began to walk with crutches. The joint of the foot was stiff, as in a false ankylosis, the tendons of the extensor muscles adhered to the cicatrix, there was a slight deviation of the foot outward and backward, and the upper fragment of the fracture of the tibia projected forward, all of which circumstances rendered the convalescence long and difficult. It was not till after one hundred and forty days of treatment and convalescence, that the patient was in a state to leave the hospital, and able to use the limb, which was less movable than the other, and presented some deformities which could not be cured.

Case 4. *Results of the old mode of treatment in a case where no severe symptoms existed.* M. J. P. F. C., a student of medicine, was running a race with a comrade, when both came to the edge of a bank which they had not remarked, and were precipitated down thirty feet upon a dry and rocky soil. Both fell upon their feet ; in one the foot was sprained, and the other, M. C., had a fracture of the fibula with a separation of the internal malleolus, and a double displacement of the foot inward and backward, characterized : first, the fracture of the fibula, by a depression on the outside, and at the lower part of the leg above the malleolus, and by the projection of this outward. Second, the laceration, by another uneven and rough prominence of the lower extremity of the tibia.

below the skin of the inside and the lower part of the leg, and by an uneven and rough depression some distance below the tibia formed by the malleolus, which was carried outward and downward. Third, the dislocation of the foot inward and backward, by the displacement of this part outward, the direction of its outer edge and of its dorsal face upward, of its inner edge downward, of its sole outward, and finally, by the prominence of the lower extremity of the tibia at the anterior part of the articulation.

Assisted by his comrade, M. C. himself reduced the dislocations, and endeavored to keep the parts in place, with handkerchiefs placed in the form of the figure eight around the articulation of the foot, and was carried to Paris in a fiacre. During the journey, there was considerable swelling around the joint, particularly on its inner face, and displacement of the foot, but in a less degree. On his arrival at Paris, the parts were replaced, and the common apparatus of fractures of the leg was applied, with this difference, that the lateral splints passed beyond the sole of the foot, and the tapes were attached as high as the malleoli, and tied strongly. Being carried home, he was bled in the arm: the swelling, however, increased; and fever appeared, with delirium.

The second day, the apparatus was removed for the dressing, and the swelling extended to the knee and thigh: the food appeared to have its normal direction; an emollient cataplasm and the apparatus were reapplied: he was bled twice. The third day spasms appeared: syrup of diacodium was given, which produced a slight calm and sleep. The fourth day, phlyctenæ were seen on the anterior and inner face of the articulation: there were also engorgements of the inguinal glands. The fifth and sixth days the engorgement diminished; the pains in the heel were relieved by applying a wet compress below the tendo achillis. The seventh day, the pains and the inflammation were again diminished: but compresses wet with camphorated spirits having been substituted

for cataplasms, excited new pains which were followed with erysipelas. The eleventh day, small ulcerations appeared in the place of the phlyctenæ: the dressing with resolvents and emollients was applied daily. The fifteenth day, the swelling of the foot had been diminished so much, that a depression of the fibula was perceptible, attended with a prominence of the external malleolus: no mode was employed to replace the parts in their natural situation, and the tape placed at the upper part of the fracture was merely drawn more tightly.

The twenty-fourth day, the pains in the ankle continued, those of the heel were diminished, and the ulcerations had cicatrized. The thirtieth day the dressing was renewed: the parts are in the same state as before.

The forty-fifth day the dressing was removed, and replaced by a bandage applied in the form of a figure of eight, around the articulation.

The depression of the fibula towards the tibia, the projection of the external malleolus outward, and of the internal inward, continued: the leg was wasted: the motions of flexion and extension were very limited: those of adduction and abduction were still more so.

The fiftieth day, the patient rose, and felt severe pain on placing his foot on the ground. For a month, he attempted to walk with crutches. The eightieth day, the motions of flexion and extension are still limited, and walking is very difficult. Severe pains are felt constantly in the articulation of the foot with the leg, in that of the metatarsus with the tarsus, in the heel, and particularly in the internal and anterior ligaments of the tibio-tarsal articulation.

After eighteen months, that is twenty-one months after the accident, notwithstanding constant exercises, and the use of emollient baths, sulphurous douches, opiated cataplasms, and liniments of different kinds, the motions, said the patient, who has given us his case, are still limited. If I walk any time, or if I stand, I suffer particularly in the ligaments of the

tibio-tarsal articulation : the extremities of the tibia and fibula are enlarged : the leg has gradually resumed its volume, but even now it is still a few lines smaller than the left leg.

Such was the result of the old method applied to a slightly complicated fracture of the fibula, which was treated by one of the first surgeons of Paris, seconded by the courage and intelligence of a patient already instructed in a profession to which he has since become an honor.

Case 5. *Results of the old method in a case of fracture without marked complication.* Lefebvre, being occupied in working on the glacis, was thrown down a distance of twelve feet, by a mass of earth, under which he remained buried for several minutes. When removed, there was a fracture at the lower part of the left leg, with a dislocation of the foot inward, which was also twisted, so that the sole of it looked outward, its outer edge upward, and the inner edge downward. A great quantity of blood was effused and infiltrated around the articulation ; the skin, however, was unbroken.

The parts were restored to their position by the usual mode of reduction ; the limb was placed in the common apparatus for fractures of the leg : as the patient was young, and of a sanguineous temperament, he was bled several times, and put upon a diet.

The apparatus was not removed for eight days : a considerable displacement of the foot appeared, which was also twisted from within outward. A large abscess existed near the internal malleolus : it was opened, and a great quantity of bloody pus escaped. Its cavity was filled with lint. The apparatus was replaced by a simple roller bandage, and the position of the foot was entrusted to some splints placed on the sides of the articulation, and a simple sole of wood. From this time the displacement continued ; sharp and continual pains, an enormous swelling, a violent fever, with delirium appeared : the skin was inflamed, became thin, mortified, was discharged in pieces, and we saw the extensor tendons of the toes, which exfoliated,

and the extremities of the tibia and fibula, which were both fractured; the former at its base, the second two inches from its malleolus. An excessive suppuration appeared, the sleep and strength failed, and a fever and colliquative sweats supervened. Amputation seemed indispensable, but it was not performed, and the patient was saved by opium, cinchona, and frequent dressings, but particularly by his youth and good constitution.

After some months, the violence of the symptoms subsided: the spiculæ detached from the tibia and the fibula at the time of the accident, and others formed by the necrosis, were discharged by suppuration. The actual cautery was applied to the bones several times to hasten their exfoliation.

After a year, the suppuration began to diminish, fleshy and vascular granulations were developed on the bones, and the fractures united firmly. After eighteen months, the cicatrix formed partly by the approximation of the skin, partly by the formation of a new cutaneous tissue, covered the seat of these disorders.

The limb was then half wasted, the foot was incapable of giving the body any support whatever, and farther it was dislocated outward, as when the accident first happened. In two years, after the patient had used a compress, and a stocking of dog's skin, with baths and douches, the limb began to resume its size and strength.

Forty-two years after the accident, and when the patient was more than sixty years old, he came to consult M. Dupuytren for a herpetic affection; the signs of the fracture were then so well marked, that among the numerous drawings of this disease which M. Dupuytren possesses, there was no figure which exactly represented his case. Walking was always very difficult, the motions of flexion and extension of the foot were extremely slight, while those of abduction and adduction were impossible; there were also numerous varices and constant swelling, which was increased on the least motion, &c.

Case 6. *Fracture with dislocation inward, and a wound on the outside of the articulation. Treatment by the old method. Severe symptoms, amputation and death.* Madame L., a young woman, was sitting in her gig; her horse became unruly, and seeing she should be thrown into the river, jumped from the gig, descending on the inside of the left foot, felt a lancinating pain at the bottom of the leg, and fell her whole length on the ground.

There appeared successively a dislocation of the foot so that its inner edge was directed upward, the sole inward, and the astragalus outward: a broad and deep wound on the outside of the articulation of the foot, between the tendons of the peroneus longus and brevis muscles, on one side, and that of the peroneus tertius and the common extensors of the toes on the other: through this lacerated wound appeared fractures of the fibula and tibia, the first, two inches from its extremity, the second, at the base of its malleolus: the pains were severe: after the reduction, Scultet's bandage was applied and the limb was placed on a pillow and extended on the thigh. The second day the dressing was removed, but the pains, which were not relieved by the reduction, continued: there was watchfulness and constant spasms: a surgeon in consultation proposed amputation, which was refused by her parents. The second day the bandage was applied and the limb was placed as before: bleeding and opiates were prescribed. On the third and fourth days, there was watchfulness, pains, spasms, the patient complained and cried out. The apparatus was removed; a glistening and elastic tumor appeared around the articulation: a mixture of fetid pus, and of altered synovia, covered the surface of the wound. About the eighth day, the preceding symptoms were considerably increased, and the nervous susceptibility existed in the greatest degree.

In the evening of the ninth day, south winds suddenly succeeded to north winds; thence involuntary contractions which were painful and permanent in the calves of the legs, the mas-

seter muscles, the pharynx, and the posterior part of the neck : the jaws were closed, there was difficulty of swallowing, a continual spitting, inclination of the head backward ; difficult, short, irregular and quick respiration, pulsations of the heart frequent and hurried : pulse quick and throbbing : cold perspiration over the whole body ; displacement of the fragments, attended with intolerable pain, after each paroxysm of tetanus : cries, constant agitation, countenance expressive of deep pain ; liquid laudanum of Sydenham in the dose of several drachms a day was prescribed ; but there was no amendment.

The tenth day, the tetanic affection had extended to nearly the whole body, which was curved in a semicircle, and at each spasm rose in an arch above the bed, resting on the occiput and the heels ; narcotics were administered in larger doses but without success. The eleventh day the dressing was removed and a phlegmonous inflammation was discovered on the inside of the tibia, emollients and narcotics were ordered. The twelfth and thirteenth days, all the symptoms of tetanus continued ; and the patient was so susceptible, that the least sound, the faintest light, the gentlest motion, the contact of uneven surfaces, the slightest mental emotion re-produced the paroxysms. The abscess formed along the tibia was opened, and a great quantity of pus escaped. It was decided at consultation that the limb should be left to itself, and the dose of laudanum was increased to several spoonsfull per day, administered by the mouth, and in enemata !

The fourteenth and fifteenth days, the foot was displaced inward, forming a right angle with the leg. The tibia and fibula emerged from the wounds : the tetanus and the attendant symptoms became extremely intense : they seemed to extend to the alimentary canal : the ingesta were rejected by the stomach through the nostrils : the belly was tense, and as hard as a plank. The sixteenth and eighteenth days, opium was given in enormous doses, and so far from causing sleep, did not produce the least calm. Attempts were made to reduce

the extremities of the two fractured bones, which projected several inches, and on which the patient rested at every spasm, thus increasing the violence of her pains: but these attempts were unsuccessful. In this hopeless state, amputation which had been considered improper some days before, was decided upon by the consulting physicians as the only mode of relieving the pains, and of giving the patient a chance for her life.

It was performed; the muscles appeared hard, very tense, black, as it were, charred after being exposed to the air. Vessels of some magnitude alone furnished blood, not a drop escaped from the others, and the surface of the wound was left dry. The symptoms still continued. The eighteenth day, they ceased a few hours before evening, but this was deceptive. The patient died at eight o'clock.

Case 7. *Reduction deferred on account of symptoms. Fatal consequences of this erroneous principle.* A servant of M. T., having ascended a pear tree, the branch upon which he was standing, broke; he fell on the inner edge of the right foot, felt a severe pain at the bottom of the leg and in the articulation of the foot, and the parts immediately swelled very much.

A country surgeon considered it only as a sprain, and merely used some resolvents, and practised venesection a few times. Another, who was more skilful, was called on the fifth day, and notwithstanding the great swelling, discovered the true state of things: but he decided to use diluents internally, to apply topical emollients, leeches, to make incisions if they were required, to open the abscesses if any formed, and to wait for a cessation of symptoms before reducing the dislocation and the fracture. The symptoms continued and increased; several parts of the skin and the cellular tissue were threatened with gangrene; an abundant suppuration occurred around the articulation, the life of the patient was endangered, and M.

Dupuytren was called in consultation with the preceding surgeon.

Struck with the extent of the displacement of the foot, the prominence of the internal malleolus and of the astragalus inward, the deviation of the foot outward, the depth of the re-entering angle which resulted from the depression of the lower fragment of the fibula towards the tibia, (fracture of the fibula with luxation of the foot inwards,) and the severity of the existing symptoms : and convinced that these depended solely on the displacements mentioned, and that they would cease when the parts were reduced, he proposed to reduce them immediately.

The attending surgeon rejected this advice, and considered the reduction as useless and dangerous : useless, he said, because it would be less difficult at a future period ; and dangerous, because the parts were not in a state to admit, without danger, the manœuvres required by the reduction. The treatment was then continued as before ; broad eschars appeared opposite the prominence of the internal malleolus, and others opposite that formed by the upper fragment of the fibula, which not having followed the motion of the lower fragment, raised and stretched the skin in a very painful manner. The whole subcutaneous tissue had suppurated. The violence of the symptoms having diminished, and a slight remission of them having supervened at the end of eight weeks, it was thought proper to reduce it. This was attempted by extension and counterextension, which were very painful and nearly ineffectual : after which the common apparatus for fractures of the leg was applied in such a manner, that the internal splint did not extend beyond the internal malleolus, and the external was depressed below the corresponding edge of the foot, and a cushion folded about two inches, also pushed this part from without inward.

Vain efforts : the foot could not be brought under the leg, either because the mode employed was not sufficiently

powerful, or because the soft parts which were still swelled by the inflammation, were changed in their texture, and unable to yield, and did not allow the bones to resume their place.

These attempts were repeated unsuccessfully for fifteen days, and they were given up.

The patient, however, after running new risks from erysipelas in the leg, bilious fevers, excessive discharges of pus, fever and colliquative sweats, was cured. But he is and always will be very much deformed, and consequently finds it difficult to walk.

Effects of M. Dupuytren's mode of treatment. 1. The first and most important effect, of which all the others are but in some measure the consequence, is the return of the foot into its situation, and its natural relations with the leg: 2. The second, which is no less important, consists in reducing the fractured fragments so exactly, that notwithstanding the extent of the displacement of the parts, but few cases show, when the treatment is terminated, the slightest trace of the accident or of the deformities produced by it: 3. The third is the almost sudden and instant cessation of the racking pains caused by the displacement and the straining of the parts: 4. The fourth is the very rapid diminution of the swelling, tension, and strangulation, which have supervened around the articulation of the foot: 5. The fifth, finally, in the removal of all the causes which may produce secondary symptoms. In fact, it prevents spasms, involuntary contractions and tetanus: inflammations and suppurations are much more rare, and in all cases are but slightly dangerous; it prevents the appearance of gangrené: the infiltrated or effused blood is easily absorbed: the lacerations of the skin are less serious and cicatrize like ordinary wounds: the internal injuries can be repaired, and the parts affected with necrosis can be exfoliated: finally, this method of treatment, if insufficient to arrest these consequences, removes their danger.

General results. The duration of the treatment; that is, of the application of the apparatus, is generally from twenty-five to thirty-five days in simple fractures, and in most of those attended with dislocation inward, outward or backward, with infiltration or effusion of blood, with the laceration of the lateral ligaments from the summit or the base of the internal malleolus : from forty to sixty days, for those complicated with serious derangements in the soft parts, whether internal or external, with inflammation, suppuration, abscesses, &c. ; from sixty to eighty, or one hundred days, and even longer in comminuted fractures, complicated with numerous spiculæ, and consequently with necrosis of the tendons and bones.

The convalescence is generally twice as long as the treatment, whatever may be the kind of fracture.

In all cases, the foot seems carried more or less inward, that is, in the sense of adduction, after the apparatus is removed. But the action of the muscles, or according to circumstances, the application of the apparatus on the outside will restore the foot to its natural position, the former in a few days, and the latter in a few hours.

Of two hundred and seven patients treated by M. Dupuytren's method, two hundred and two have been cured ; five only have died, three from symptoms dependent on the disease, and two from complications independent of it.

In all patients who were cured, the limb has preserved its form, except in two cases, when the heel extended a little backward, and the lower extremity of the tibia projected slightly forward.

All have recovered the free use of the motions of the foot ; in one only there was an ankylosis of this with the leg.

ARTICLE XV.

FRACTURES OF THE PATELLA.

FRACTURES of the patella present several interesting points for examination, upon which the opinions of authors still differ. Among these are particularly the manner in which they occur, the most suitable mode of treatment or dressing, the formation of the callus, and particularly the possibility of obtaining a direct union of the fragments.

Six patients affected with fractures of this kind have been treated at Hotel Dieu by M. Dupuytren, since the commencement of this course of lectures. In all, the fracture was transverse, in none, vertical. Five have been perfectly cured without any deformity, and have recovered the utmost freedom in the use of the limb. One of them is still under treatment. In him the fracture was caused by falling on the left knee: it was attended with considerable swelling, produced by an effusion of the blood into the soft parts and of bloody synovia into the articular cavity. It, however, was not difficult to discover the injury; on passing the finger over the patella, a large interval was remarked, which separated the bone into an upper and lower fragment: we could also move each of these fragments in opposite directions, approximate them by extending the limb, and cause crepitation by rubbing them together: notwithstanding the severe symptoms attendant on the fracture, the patient was cured rapidly. But it happened in him, as has occurred in many other patients under M. Dupuytren's notice: the cross bandage which united the affected part transversely, acting only on one part of the skin, had formed

a fold, which was interposed between the fragments like a kind of wedge which kept them separated. He applied a new dressing.

A fracture of the patella may be produced in two ways: by direct blows upon the anterior region of the knee, or by violent efforts of the extensor muscles of the leg. Sometimes, however, it has occurred without a great increase of the muscular force.

In fact, in some cases it has resulted from the action of jumping, of kicking, and of preventing one from falling backward. In all these cases, only one part of the posterior surface of the patella rests against the anterior face of the femoral condyles, while at the same time the leg being partly flexed, the lower ligament of the bone and the tendon of its extensor muscles draw its extremities firmly backward. During this effort, the femur serves as a point of support to the powers which act above and below on the patella, and this latter is broken from its anterior to its posterior face.

A great number of these fractures have been wrongly attributed to falls upon the knees: it has not been observed, that in this case nearly the whole weight of the body comes on the prominence of the tibia to which the ligament of the patella is attached: the leg being bent at a right angle, this process of the bone strikes first on the ground and receives the whole shock, while the patella, retained above by the rectus femoris muscle, and preserving in great part its vertical position, cannot touch the plane on which the knee rests, except at its lower extremity. Falls on the knees are then very frequently the consequence and not the cause of fractures of the patella; the man falls because this is broken, and the fracture is not caused by the fall.

Cutting or bruising bodies, when acting on the knees, may break the patella directly into one or more fragments: this accident may happen in a fall, if the leg be firmly flexed on the

knee, if the bone strike violently against the unevenness of the soil ; nevertheless, even in this case, the action of the muscles contributes very much to produce the fracture. In fact, we know, that the least blow upon the knee will cause the rectus femoris anticus muscle to contract, and that these contractions need not be very strong to break the patella : to this cause, probably, must be attributed the frequency of transverse fractures, and the rarity of those in a vertical direction.

Thus, as we have already mentioned, there are marked differences between the fractures of the patella produced by the efforts of the muscles, and those caused by direct injuries of the knee. The former, said the professor, are rarely accompanied with contusions, with lacerations of the soft parts or in the articulation, at least, if the patient does not fall upon the injured parts after the fracture ; the second, on the contrary, are often attended with extensive derangements in the adjacent tissues : sometimes the patella has been broken into a great number of pieces which separate in every direction, while at the same time the articular capsule is opened, and blood is effused into its cavity. These complications usually render the consequences of the primitive disease very serious. The following is an instance of them.

A patient, who was advanced in life, was affected with a fracture of the patella with slight separation, but attended with bad symptoms ; he died last November, after a long illness, with cerebral and enteric disease. The patella was examined with care. At first view the fracture could hardly be distinguished : the patella was movable : the groove formed by the separation was imperceptible to the eye, but easily felt : the finger being carried from above downward, perceived a groove which could be followed perfectly : motions across also showed the mobility of the whole bone.

The articulation being opened, appeared internally of a deep red, filled with a bloody purulent matter, which could be collected with a scalpel and placed on a cloth : in this part

then, there had been an inflammation terminated by exsudation. The presence of the blood might depend on the bruise occasioned after the fracture. The synovial membrane was very red, and the redness depended on the development of the blood vessels. The cartilages also were inflamed. These derangements of the joint accounted sufficiently for the symptoms of which the patient died.

On the inner face of the patella was a transverse fissure, but it was situated lower than on the outside. The bone consequently had been fractured crosswise from below upwards, and from before backwards. The two fragments, also, were intimately united; there was nothing between them: there was no trace of the fracture on the side of the tibia, and these traces on the side of the fibula were very slight.

From the preservation or the destruction of the fibrous layer which covers the fibula, also results a marked difference in the facility with which the relations of the fragments can be preserved, and in the solidity of the parts after the cure. In fact, this fibrous layer forms a kind of sheath, which retains these fragments, prevents them from separating very far, and serves in a manner as a base to the substance which is afterwards to unite them. We can conceive then how attentive we must consequently be to avoid the extensive motions which are too frequently made to satisfy us of the existence of fractures of the bone it protects.

Although the vertical fracture is less common than the others, cases of it are not unfrequent: it, however, is hardly mentioned in the most modern treatises on surgery. The instance described most anciently, and perhaps the only one stated with any precision, is found in Lamotte's treatise. The fracture was caused by a fall from a high place; the two portions of the bone were slightly separated, although the limb was partly flexed: it was completely extended, the knee covered with resolvent compresses and a moderately tight dressing. The union was perfect in about twenty days, and the patient soon

resumed his ordinary labors. The callus was but slightly apparent.

About twenty years since, M. Dupuytren received into the wards at Hotel Dieu, a middle aged man who fell from a lofty place and broke a great number of bones : the right knee was very much bruised and deformed. The patient died the third day after the accident. The examination of the knee, showed a longitudinal fracture of the patella. This bone was divided into two nearly equal parts ; the fragments were very movable, their crepitation was manifest, and they could be displaced in every direction ; the articular capsule contained a great quantity of bloody fluid.

Six months afterwards a man was brought to Hotel Dieu : he was drunk and had been overturned by a cart. The left leg knee and thigh showed the marks of the iron rim of the wheel ; this rim had passed from above downward over the limb, and the patella was divided in the same direction. The crepitation of the fragments was perceived, and also their displacement in a transverse direction, which was remedied by the position of the limb, and by an appropriate bandage. The cure proceeded rapidly, when the patient was attacked without any known cause, with a pleuropneumonia, and he died the twentieth day after the accident. The injured parts were examined very attentively, and we found a full formed callus uniting the fragments, and admitting but of very limited motions. The articular surfaces were in exact relations, and every thing showed that the cure would have been perfect in less than a month.

Three years after, a man came to Hotel Dieu to be treated of a varicose ulcer in one leg. On examining the affected limb, M. Dupuytren perceived that the patella was very broad, and also that there was a vertical prominence, which was very apparent. Nothing similar appeared on the opposite side. Interrogated as to the cause of this deformity, the patient stated that some years before, he had a fall, by which the leg and

thigh were broken in several places. The patella also had been fractured, and the increase in its size proved that the callus was considerably developed. The bone moved easily on the condyles of the femur when the extensor muscles of the leg were relaxed : but then, we perceived the rubbing of a marked prominence against the condyles of the femur. It was evident that the fracture had been vertical, and that this irregular union resulted from the powers of nature alone, or from the bad position of the parts.

The following is also an important instance of a fracture of this kind.

A domestic, nineteen years old, small, a brunette, and of a feeble constitution, had been for a long time affected with pulmonary catarrh with a very abundant expectoration of mucus ; she fell accidentally from the second story upon a grating which gave way, and she was precipitated upon the pavement in the court-yard : there was a wound on the left knee, and the head was slightly injured. She arose, but could not support herself on the wounded knee : she was placed on a bed, the wound was brought together, and a dry dressing applied. She was afterwards carried to Hotel Dieu, and the dressing was removed ; the wound had not united, and the patella was fractured vertically into two unequal portions. The bruised parts presented a very considerable infiltration of blood : suppuration was abundant, and the patient felt very severe pains in the whole extent of the limb.

Her general state was not very encouraging : the tongue was rough at its edges and its point, its centre and roots were covered with a white coat, the mind was not clear, the skin was hot and dry, the thirst urgent : there was complete anorexia, and a wakefulness which yielded to opiates. Farther, the bowels were torpid, there was no diarrhea ; but the cough was violent and frequent, and the expectoration, which was mucous, was copious. The patient died of some internal affections. Several fractures of the same kind have been treated

more recently by M. Dupuytren, at Hotel Dieu. It is then demonstrated that these kinds of fractures, which have been passed over in silence in almost all works, the existence of which has been doubted by many authors, are not rare: and on the other hand, the facts observed, prove the justice of the professor's remarks, that they always depend on the direct action of external causes, and that they are generally attended with more or less serious wounds and contusions, which demand the practitioner's special attention.

The diagnosis of fractures of the patella is generally easy; when this bone is broken transversely, if the patient is standing erect, he immediately falls and is unable to rise; or if he attempt it, he immediately perceives that the limb has lost its strength and solidity: he is unable to walk and can only drag himself along with the other limb, the injured leg being extended. These circumstances indicate already the existence of the fracture, but on examining the knee we find it deformed and flattened, and on touching the patella, we readily perceive the separation between the fragments of this bone: the upper fragment is drawn upward by the muscles which are inserted in it, while the other is kept in place by its inferior ligament. If we extend the leg forcibly, and raise the whole of the limb on the pelvis, we relax the muscles of the anterior part of the thigh, and the separation of the fragments almost disappears. If we then seize these fragments, and rub them against one another, in opposite directions, we feel and sometimes hear the crepitation; the injury is now established. The engorgement in the knee seldom prevents entirely the diagnosis: the thinness of the integuments, and the softness of the tumor, usually allow us to feel the patella without much difficulty, and to discover its fracture. When it is oblique or longitudinal, it requires a more minute examination to be discovered, on account of the slight distance between the fragments, which are not separated by any muscular power. If, however, the leg be semiflexed on the thigh, as was done by Lamotte in the case

we have mentioned, the fracture of the two portions of the bone is more marked. In all cases, if severe symptoms, as a considerable swelling of the joint, prevent us from determining it positively, it will not be as inconvenient in this as in other kinds of fractures, to employ for them the proper modes before proceeding to the reduction.

From our remarks, said the professor, it will be easy to conceive what should be the base of the *treatment* of these fractures: it consists in applying the proper remedies for the symptoms which attend them, and in procuring the most exact union possible of the two parts of the divided bone. Rest of the limb, general and local bleedings, topical emollients and cool drinks, will commonly attain the first intention. It is well understood that we must not lose sight of the general state of the patient, that of the digestive organs, and particularly of the brain, the functions of which are frequently deranged, either from commotion, or from the wound.

In respect to the union of the fragments in the transverse fracture, as their separation is produced and constantly increased by the extensor muscles, the tendon of which is inserted in the upper fragment, and by the greater or less flexion of the leg, the first indication will be to neutralize this muscular power, and to place the limb in a proper position. This position, the immobility of the limb until the fracture is perfectly consolidated, and the application of a bandage to keep the fragments exactly in place, and to resist the contractions of the extensor muscles which may result from the inconsiderate or involuntary motions of the patients, are the essential conditions for obtaining a perfect union. M. Dupuytren's apparatus consists of the following: it is composed, first, of an inclined plane, formed of several super-imposed pillows, which should extend from the heel to the tuberosity of the ischium, and which answers the double purpose of opposing the contractions of the flexor muscles of the leg, and of completely relaxing the extensor muscles, by the situation of the limb; second, of two

compresses, about twenty inches long and four inches broad, made of thick, strong, unbleached cloth ; the first presents three openings at one of its extremities ; the other is divided into three strips at its opposite extremity : third, of two bands three fingers broad, and from eight to ten ells long : fourth, of some graduated compresses six or seven inches long, and from seven to eight lines thick.

We begin by enveloping the foot in a few turns of the bandage ; we place on that part of these turns which looks to the back of the foot, the extremity of one of the two long compresses ; the whole is confined with pins, and with two or three new turns of the bandage, and then the compress is extended from below upward, on the anterior face of the leg. That done, the turns of the bandage are continued obliquely, re-ascending along the limb until just below the patella : at this point, its extremity is turned down parallel to the leg. While an assistant then raises, forcibly, the muscles of the posterior region of the thigh, the operator surrounds this at its centre with three turns of the second band : he then places the extremity of the second long compress on its anterior face : it is fastened there by two or three new turns : the extremity is turned down from above downward, and then the oblique bandage is continued to the upper edge of the patella, the remainder of it is folded on the thigh. Graduated compresses are then placed above and below the patella, and the slips of one of the long compresses in the corresponding splits of the other compress, and the fragments are brought together by pulling upon the slips. Finally, the two ends of these compresses are attached, one on the thigh and the other on the leg.

The dressing being thus applied, the whole limb is placed on the inclined plane above mentioned. It is inclined from the foot to the tuberosity of the ischium. In other words, the highest or rather the thickest part of the plane formed by the pillows looks to the heel and the lower part of the leg, and the lowest or thinnest part to the upper part of the posterior

face of the thigh. In this manner, the heel is much higher than the knee and thigh.

From this description, said the professor, you will see that the apparatus we use is formed of four distinct parts, each having a distinct action, nevertheless, attached to each other, and forming one whole, which all tend to the same end. The first part, the inclined plane composed of pillows, serves to keep the limb properly extended: the second part, applied on the leg and the foot, and the third on the thigh, are designed to check and prevent the contractions of the muscles: finally, the fourth part keeps the surfaces of the two halves of the fractured bone perfectly together and continuous. Still, although this apparatus presents incontestable advantages sanctioned by experience, it would be insufficient to produce complete union, as is true of any other which can be imagined, unless the patient should second these efforts by his docility. Hence the limb should be kept perfectly motionless. About three weeks since, two individuals affected with fractures of this kind, left Hotel Dieu, cured: but one of them, a young and turbulent man, was constantly in motion, and several times removed his dressings during the treatment: in him, the fragments were separated an inch: the other, on the contrary, bore the inconveniences of rest and the compression of the bandage with a great deal of courage and patience, and in him the groove of the union of the fragments was hardly large enough to admit the head of a pin. This fact, and a great number of others, observed by M. Dupuytren in his long and extensive practice, leave no doubt in his mind on the possibility of obtaining an immediate union of the fragments by the formation of a bony callus, if these fragments can be kept in perfect contact the whole time necessary for their union.

Most commonly, the union takes place by means of a celulo-fibrous substance developed between the pieces of the fracture: Sir Astley Cooper and other surgeons, said the professor, have carefully observed fractures of the patella and of the neck

of the femur, and after exposing these bones to the action of turpentine, they have found a transparent fibrous or fibro-cartilaginous substance between the fragments. When this celebrated English surgeon was at Paris, in 1829, I presented to his examination some specimens where the immediate union took place, and where this fibro-cartilaginous matter could not be observed. This union must doubtless be attributed to the long time which elapsed after the cure; the callus had time enough to become bony. Observe, in fact, what takes place in vertical fractures and you will be satisfied that my opinion is correct. In these cases, as there is no separation, the callus is always ossified at the end of six months or a year. Hence it is this separation produced by the action of the muscles, which prevents ossification, and when this action is neutralized, the transverse union is similar in every respect to the longitudinal union.

But however firmly and properly the bandage may be applied, its action is constantly weaker from the loosening of the parts which form it, and from the collapse of the tissues which it compresses: while the muscular power increases in the same proportion. On the other hand, the compression of the bandage often becomes insupportable to the patients, and we are obliged to loosen it or to remove it entirely. Sometimes it produces severe symptoms, inflammation of the parts, excessive tension and swelling, and consequently gangrene. These symptoms occur more readily, the sooner the bandage is applied after the accident. Hence, added the professor, we must be careful to tie it moderately at first, and afterwards we must observe the patient attentively, in order to prevent in time the fatal accidents which we have mentioned.

In support of these precepts, we shall mention a recent case, the history of which has been published, and which ought to cause in the surgeon bitter regrets that he did not follow them. Facts produce a lively impression on the mind, and are long remembered.

A man, forty-three years old, fell on his right knee, and the patella was fractured: he was carried to one of the Parisian hospitals: it was not Hotel Dieu. The next day, the articulation was considerably swelled and very painful: however, a dressing was applied somewhat analogous to that used by M. Dupuytren: it was so tight, that in the evening the patient could not bear the pain it caused: he passed a restless night; and was continually crying out from agony: there is no account of the visit of the third day, and it was not for forty-eight hours, four days after the dressing, that the loud and constant complaints of the patient, led the surgeon to remove the bandage. Ecchymoses were formed on different parts of the leg and foot, and some brown spots were perceptible, still the bandage was applied as tightly as before; but the general state of the patient again obliged the surgeon to remove it. Numerous brown spots then existed on the back of the foot and the leg: gangrene appeared, delirium supervened, the skin was warm and pale, but the lower part of the leg soon became cold, insensible, and putrid. The sixth day after the fracture, there were but slight hopes of saving the patient's life by sacrificing the limb. The hospital surgeon then amputated the thigh, and united it immediately; but the patient died the next day.

The following was the state of the parts, and of the process which had taken place for sixteen or seventeen days after the accident. The fracture was transverse: the two fragments were an inch distant from each other; the relations between them were preserved by the continuity of the great tendon of the extensors, which consequently had not been divided, and by small fibrous portions which extended from one part of the bone to the other, and which came from the interior of the patella and not from its surfaces. This species of fibres was at first considered as new productions; but this was soon found to be erroneous by comparing their resistance with the recent period of their formation. The fractured surfaces were not

rough. They seemed to have been softened or destroyed by absorption. Between the two fragments was a reddish substance, which became more consistent the nearer it was to the fractured surfaces. In this part, it was almost of a cartilaginous consistence, and already appeared to be connected with the patella.

The treatment of vertical fractures as well as of the other kind requires rest, immobility, and the complete relaxation of the fibres. It has been advised, said M. Dupuytren, in accordance with theoretical views, to cause the triceps femoris muscle to contract, in order to bring together the two portions of the patella which are divided longitudinally. This practice is bad, and experience proves that by making the articulation project, the fragments are separated, probably, from the anatomical arrangement of the osseous surfaces, and from the insertion of the articular capsule around these same fragments. The tension of the soft parts is just as injurious in this case as in the union of longitudinal wounds of the muscles. These ideas are purely speculative, and are by no means justified by practical results; on the contrary, the best mode is to keep these muscles as much as possible in a state of relaxation, and this principle applies to all similar injuries. Farther, the passive state is the only one which can be supported: and we must not forget that the patients soon lose the power of bearing a permanent contraction.

The limb, continued the professor, should be then a little elevated by pillows, and protected by a cradle from the pressure of the bed clothes. In this position, the fragments cannot separate, and the formation of callus proceeds regularly.

In these kinds of fractures, as in those of the neck of the femur, for instance, the callus is consolidated in from sixty to eighty days, or even more. At this period, if the state of the soft parts permit, the patient need not be prevented from taking exercise; for the arrangement of the fragments leaves no fear in regard to the length or the deformity of the callus. Farther,

by applying a knee-piece or a simple roller bandage, we can render the articulation solid enough to resist all accidents. Besides, experience and observation demonstrate that by continuing longer in bed, we observe the formation of an osseous cicatrix, which is almost imperceptible and firmer; in a word, that the extent of the groove, or the separation observed after the formation of callus, is inversely as the continuance of this mode. Let us mention an instance of it:—A man fell, and there was a comminuted fracture of the patella, and at the same time the upper part of the femur and the skull were broken: he was obliged to remain five months in bed. A common bandage was applied for a month or six weeks, which was removed as often as the looseness of the bands required it. In about five months, the fracture was united so firmly and so exactly, that the broken part could not be discovered: we could perceive only a slight and very hard unevenness on its surface.

ARTICLE XVI.

OF LUXATION OF THE VERTEBRÆ, AND THE DISEASES WHICH RESEMBLE IT.

THE displacements of bones have been so well observed and so correctly described, and this part of the healing art has arrived to such perfection, that it seems as if we should confine ourselves to established facts and to the principles laid down by authors.

However, said M. Dupuytren, it is not with this part of

medicine as with all the other branches of the sciences; the true limits of which very frequently are not observed, until the obstacles which concealed them from the eye of the observer have been removed.

The articulations of the vertebræ placed at the bottom of the scale of movable articulations on account of the small extent of their motions, and the nature of the connection of the bones which form them, have always appeared but slightly exposed to dislocations, which are observed so frequently in articulations which have extensive motions and contiguous surfaces; and if we except luxations of the first cervical vertebra on the second, the others, have not been observed, or have been completely denied by most writers.

Many ancient authors, continued M. Dupuytren, have, it is true, spoken of these displacements; but as they could not unite to their observations the results of post mortem examinations, their opinion has been of no weight, or has been altogether rejected: it is particularly since the cultivation of pathological anatomy has permitted us to assign the effects of diseases to their causes, that these dislocations have been considered impossible.

In fact, the number and the strength of the ligaments between these bones, the nearly vertical or slightly oblique position of their articular processes, the reciprocal reception of their upper and lower processes, the extent of the surface by which these bones touch, and their slight degree of motion, must at least render this dislocation very difficult: and if we consider with these obstacles the facility with which the bodies of the vertebræ are broken during life in consequence of efforts supported by the vertebral column, or rather after death, in the thousand experiments made on this subject, we shall not be astonished at the opinion entertained by most modern physicians in respect to this subject.

The arrangement of the articular processes of the vertebræ, presents so great obstacles to the dislocation of these bones,

that some authors have found it difficult to conceive how they could be dislocated as long as these processes remain.

This opinion, which seems very well founded, said M. Dupuytren, derives new weight from the cases I shall mention: nevertheless, luxations of the bodies of the vertebræ, which were facilitated in two of these cases, by the previous fracture of the articular processes of these bones, may also occur without this fracture; and this is proved by the third case, the most important of those I have collected on this subject.

These remarks apply to the dorsal vertebræ, and still more particularly to those in the lumbar region, which have a much broader body than the others, and in which the articular processes have a vertical direction; which is the direction of the most distinct and most extensive motions executed by these parts. Most practitioners now think also, that the cases of dislocation of the dorsal and lumbar column, characterized by a sharp and angular, and sometimes rectangular and permanent curve of the dorsal and lumbar vertebræ, with or without paralysis of the lower extremities, supervening in consequence of a blow on the trunk, of the tumbling of earth, or of a fall from a lofty place on the neck, and from which some patients have recovered, the spine preserving, however, its irregular direction, were fractures of this part.

But if authors reject luxations of the bodies of the vertebræ as impossible, they, however, admit those of the articular processes, and particularly that of the atlas with the axis. In order to have a correct idea of this latter luxation, we will say a few words, added M. Dupuytren, on the mutual relations of these two vertebræ.

The atlas is articulated by its anterior arch with the odontoid process of the axis, and by its lateral masses which present a broad and almost plane surface with the lateral portions of the same vertebra, which also have some articular surfaces, The modes of union of these two bones, confined to a capsule

and a transverse ligament, which is designed to complete the ring in which the odontoid process is received, would expose them to frequent dislocation, were they not kept in place by a special ligamentous system, which extends from the occiput to the axis, and is composed of the two lateral ligaments of the odontoid process, and of their accessory ligament, of the suspensory ligament, of the transverse ligament, and finally of the large ligament which extends from the basilar process to the posterior face of the body of the fifth vertebra. The solidity of these articulations depends on this apparatus: this confines the rotatory motions of the head within proper limits: and this by its elasticity prevents these articulations from alone participating in the flexion of the head, which therefore results from the partial motions executed by the other cervical vertebræ.

The luxation of the atlas on the axis may be produced during a violent flexion of the head, or by the effect of a forced rotatory motion of this part. It is always attended with the compression or with the rupture of the spinal marrow by the odontoid process and the body of the axis, it is immediately fatal, and beyond all the resources of art. The cases of cure of this disease which are found in some books, were cases of dislocation confined to the articulations of the articular processes of some of the other cervical vertebræ.

The luxation of the other cervical vertebræ, is generally confined to one of the articular processes: it is frequently produced by too rapid a motion to look backward: it has also been seen in children from the effect of a fall on the head, during which the neck, too weak to support the weight of the body, had been carried to one side, a circumstance necessary to produce this kind of dislocation.

The reduction of these luxations is very dangerous; we have often known an individual to perish from the compression or the elongation of the spinal marrow which always attend these attempts. Petit Radel saw a case of a child who died during the manœuvres required by this reduction. Hence it is

generally recommended to leave the disease to itself. The pains are gradually allayed : but the individuals always have their heads turned.

The details we shall present, said M. Dupuytren, will enable you to understand the diagnosis of false dislocations, several cases of which will be mentioned hereafter.

Let us now cite some cases of luxation of the bodies of the vertebræ.

Case 1. *Rupture of the ligaments of the bodies of the vertebræ without displacement.* A man fifty years old, was standing near a cart, his body firm, the head and neck inclined forward, in order to take on his back a quarter of beef : the beef slipped from the other's hands, and came with violence on the neck of the butcher, who fell.

He was carried immediately to Hotel Dieu, where we saw him the next day : the lower parts of the body were destitute of motion and feeling.

The posterior and inferior part of the neck was painful to the touch and to the least motion, and presented a broad ecchymosis, but no tumor, and at this place there was a manifest crepitation, when the patient's head was turned or raised. The arm, the parietes of the thorax and abdomen, and the lower extremities, were destitute of motion and feeling : there was paralysis of the bladder, and retention of urine. The diaphragm, the muscles of the neck and those of the face, were alone capable of contracting ; respiration was difficult, but the voice was hardly changed. The patient remained two or three days in this state ; the respiration then suddenly became extremely laborious and embarrassing, the pulse was irregular, the eyes prominent, the skin red and livid : finally, the patient died, with symptoms of suffocation.

On opening the body, we found a very broad ecchymosis around the last cervical vertebræ. The intervertebral substance between the fifth and sixth cervical vertebræ, was completely torn, and the bodies of these last were uninjured. The spinous,

transverse and articular processes, of the fifth, sixth, and seventh cervical vertebræ, were broken, and the upper part of the vertebral column could be displaced on the lower from before backward.

The spinal marrow seemed at first uninjured, notwithstanding the disorder of the surrounding parts, only it was a little larger than usual: but when it was opened, the centre seemed as it were putrid, and mixed with decomposed blood.

Case 2. *Rupture of the ligaments of the bodies of the vertebræ, with dislocation.* A man, from forty to forty-five years old, who was employed in the quarries, while stooping forward, was struck by a mass of earth on the loins, and sunk under its weight, after trying to clear himself. The patient at first was carried home, where he remained three days, destitute of motion and feeling in the lower parts of the body: the fourth day he was brought to Hotel Dieu. The upper part of the loins then presented a broad tumor, soft in its circumference, hard and raised in its centre, where an evident crepitation existed. On the side of the abdomen was another tumor, which resisted in every part, which was elongated in the direction of the vertebral column, and placed in its course. The height of the abdomen was evidently diminished, and the base of the chest nearly touched the crest of the os ilium. There was at the same time a complete paralysis of sensation and motion in the lower extremities, and in the parietes of the abdomen. The bladder was distended, and also paralyzed, and the urine dribbled away involuntarily. The feces were retained, and the belly was large, but soft: the pulse was small and corded, the respiration short and difficult. The patient complained of dull pains in the dorsal region. The intellectual functions were unaltered.

The tumor in the loins and that in the abdomen, the crepitation which was heard posteriorly, the approximation of the chest and pelvis, the paralysis of the lower limbs and of the

bladder, indicated a fracture in the vertebral column, with displacement.

The fifth and sixth days after the accident, the paralysis extended to the left upper extremity; the motions of that on the right side became slow and uncertain. The seventh, the respiration was more difficult, and was performed only by the diaphragm, and the patient died of asphyxia by the successive interruption of the mechanical and chemical phenomena of respiration.

His body was examined in our presence, by Dr. Calabre.

The transverse and articular processes of the last dorsal and of the first two lumbar vertebræ were broken. The body of the last dorsal and that of the first lumbar vertebra, were separated from their processes and from the body of the second lumbar vertebra, and had passed before this latter for more than an inch. The spinal marrow was lacerated, and the pillars of the diaphragm were torn: a broad ecchymosis surrounded the vertebral column. On examining attentively the vertebræ which were displaced, it appeared that their bodies were not broken, but a laceration of their intervertebral substance existed, which in a corner only had torn a very thin layer of the lumbar vertebra.

Case 3. A female, fifty-six years old, who was very tall and fleshy, while descending a stair-case, in the evening, fell backward, upon the lower and posterior part of the neck, which struck against the edge of a stair.

The patient fell twenty steps; and when she was taken up there was no motion nor sensation in the parts below the neck. She suffered much the whole night in the lower part of this region, and was extremely thirsty. She had no evacuation. The next morning she was carried to Hotel Dieu. She experienced severe pains at the base of the cervical region, which were increased by the least touch and at the slightest motion. The head and the neck were inclined forward, and a little to the right; the posterior part of this latter region was depressed,

and the upper part of the back projected. There was a total loss of sensibility in the lower extremities; the rectum, the bladder, and the abdominal parietes, all seemed dead as far as the diaphragm. Above this point, the thoracic extremities were also partially affected with loss of motion and sensation: the respiration was frequent and laborious; but the voice, the senses, the motions of the face, and the intellectual faculties, were unimpaired, and seemed to belong to another individual. Further, the pulse was soft, the tongue was dry and slightly brownish, the exhalation and vital warmth of the skin were natural.

It was easily seen from these symptoms that a very severe affection of the spinal marrow existed, caused by a fracture and dislocation of the vertebral column.

The patient was bled in the arm, and in the evening the respiration seemed improved, the thirst less urgent, and the tongue more moist: however, there was no doubt the female would soon die: in fact, the following night, the respiration became stertorous, the articulation difficult, the face livid and puffed, and the patient, whose intellectual functions remained undisturbed during all this time, died in the morning, thirty-four hours after the accident.

At the post mortem examination, made in our presence by Dr. Pouqueville, we observed an ecchymosis and bluish suffusions in the posterior part of the neck: a projection backward of the upper part of the dorsal column, and another of the cervical region, in the opposite direction. The cellular tissue and the subjacent muscles were bathed in blood. The parts situated directly upon the vertebral column were destroyed, and left the upper articular processes of the seventh cervical vertebra exposed, while the sixth vertebra of this region projected half an inch before it.

In the space between these two bones, the spinal marrow was tense from behind forward, and from above downward,

flattened and compressed on the body of the seventh cervical vertebra.

The vertebral column, when examined anteriorly, presented a very remarkable prominence of the whole thickness of the body of the sixth cervical vertebra; this prominence was surrounded with blood. The anterior ligaments of the spine were destroyed, and the pharynx was lacerated.

The cervical portion having been carefully detached, the yellow ligaments were found to be torn, as well as the anterior and posterior ligamentous envelope, and the intervertebral substance which unites the sixth and seventh cervical vertebræ. This substance was lacerated, so that two-thirds of it adhered to the seventh vertebra, while the sixth had retained only one-third.

On examining particularly the displaced vertebræ, we saw that the seventh cervical vertebra was entire, while the top of the spinous process of the sixth, and also the edge of its lower articular processes were slightly broken. All the articular processes of the cervical vertebræ, situated above the luxation, were in the usual state; that of the seventh cervical vertebra, with the first dorsal vertebra, was much more movable than usual.

Of these three cases, the first presented an instance of the laceration of all the vertebral ligaments, and of the fracture of their articular processes without displacement of the bones; the second, an instance of the same, followed with displacement of the vertebræ; finally, the third, a pure and simple luxation, without any previous fracture of any part of these bones.

In the three cases, the vertebral column has been surprised in a state of tension, which was increased at the time of the accident. There was percussion and not merely distension of this part. The causes of this disease have all acted on the posterior part of the vertebral column.

In the three cases, the intervertebral substance has been lacerated while the bodies of the vertebræ remained uninjured;

but in the first two, the spinous, the transverse, and the articular processes have been broken and separated from the bodies of these bones, while in the latter, all these parts were uninjured. In the first, the force which acted on the vertebral column, seems not to have been sufficiently powerful to cause a displacement. In the second, it caused the laceration of the ligaments, the fracture of the processes, and a very great displacement in the thickest part of the vertebral column. Finally, in the third, it caused a remarkable laceration of the ligamentous substances, and a very great displacement in making the articular processes of one of the vertebræ glide upon those of the other.

In the three cases, the lesion of the spinal marrow rendered the disease serious; all the parts below this lesion have also been affected with paralysis, notwithstanding the different relations between the disunited bones. Finally, in the three patients, the affection confined at first to the parts below the injury of the spinal marrow, soon extended from below upward, and finally affected the origin of the diaphragmatic nerves: respiration, which was hitherto not so laborious, suddenly became very difficult, and the patients died from the successive interruption of the different phenomena of respiration. This termination, which is so quickly fatal, is always seen whenever the injury occurs above the origin of the diaphragmatic nerves, while life can continue a greater or less time, when it exists below their origin. Thus the assertions of authors, that the dislocation of the bodies of the vertebræ is impossible, is refuted. If more proofs are required, we refer you to the anatomical cabinets of the School of Medicine, and the Garden of Plants, and you will there find additional facts to support our assertions. After mentioning the signs of luxation of the vertebræ, and the disorders which attend these solutions of continuity, and showing that their diagnosis is obscure and difficult, it will not be uninteresting, in connection with this disease, to describe a malady which resembles luxation of the

vertebræ and has deceived enlightened practitioners more than once.

Case 1. *A rheumatic affection resembling a luxation of the cervical vertebræ.* A child, about fifteen years old, was brought the 30th of last January, to M. Dupuytren's consultation, by several physicians, who considered it a case of luxation of the first vertebra on the second. The following was the account given of the accident; this young man, two days before, made some violent motion in taking off his shirt. At that time, he felt a severe pain in the cervical region, and heard a crackling; his head was inclined to the left, remained in this position, and was motionless. Surgeons having been sent for, pronounced it an imperfect luxation of the first vertebra upon the second. The case seemed to them obscure and difficult, and they advised the parents to carry their son to Hotel Dieu. When he was examined, it was seen that the head was very much inclined to the left, and the spinous processes of the first vertebra were prominent: the neck was rounded from the opposite side: he experienced severe pains which increased on the least effort to straighten the head. He complained also of numbness and lancinating pains in the right shoulder and the upper limb of this side: he swallowed with difficulty, and could neither flex nor turn the head, which was inflexible on the trunk.

Most of the physicians and pupils who followed M. Dupuytren's lectures, had the same opinion as the practitioners who had first seen the patient: but this was not true of M. Dupuytren. He no sooner saw the young man, than he rejected all ideas of an imperfect luxation of the first cervical vertebra on the second, and affirmed that the symptoms arose from rheumatism. Although habituated to the surprising truth of M. Dupuytren's diagnosis, many had their doubts in this case. I admit, added the professor, that there are many reasons for believing in a luxation; hence, I will state the grounds of my opinion to the contrary. I have often known a severe pain to

be felt in the region of the neck in individuals subject to rheumatism, produced by the fixedness of the rheumatism which had hitherto been wandering about the body: Thus some persons in dancing, are suddenly seized with a severe pain in the calf of the leg, which does not depend on the rupture of the tendon of the plantaris muscle, and which prevents them from walking for two or three days. When these pains cease in one place, they not unfrequently appear in another. Persons, also, while stepping into a gig, suddenly feel a pain in the kidneys and in the common mass of the sacrolombaris and longissimus dorsi muscles, and this pain is so acute, that they turn around affrighted, imagining that they had been struck with a cane or sword. But I am induced to admit the existence of rheumatism in this young man, because he is employed by a wine merchant, and is obliged every day to remain some time in the cellar, and finally, because he has had rheumatism several times. Scarificators must be applied to the left part of the neck.

The next day we saw that M. Dupuytren's diagnosis was correct: the amelioration was so great that one could hardly have believed that the symptoms of the previous day existed, unless he had seen them. Although the neck was still a little tense, and slightly turned to the left, the patient could flex and extend the head, and it could be twisted. It is essential to remark that no attempt at reduction had been made, and yet the patient had no longer any numbness in the right side. From this time only emollient cataplasms and warm under-waistcoats were used, and five days after the accident, the young man again came to the amphitheatre, and all traces of his disease had disappeared: the same day he left the hospital.

In connection with this fact, we may mention the two following.

Case 2. *Distention and engorgement of the intervertebral ligaments of the cervical region.* A man came to Hotel

Dieu, for a pain in the cervical region. He stated that during the revolution of July, he had been struck on the neck and head with the butt end of a musket, but he admitted that some months previous he had fallen down. He soon felt a severe pain, but continued to work. On entering the hospital, the neck presented a concavity forward, and consequently its form was changed: the upper part of the cervical column projected, and the spinous processes could be easily seen. The head could not be made to perform any rotatory motion, and when he wished to turn around to look or to walk, his neck was perfectly stiff: he felt pain on making a sudden motion. The disease was increased by labor, and an engorgement of the ligaments which united the vertebræ, supervened. The first time the scarificators were applied they were attended with great relief: they were used again on the opposite side, but not with the same results: a moxa was then applied to the neck, which was attended with such relief that the patient asked for a second. The effect of these remedies will be to cure the patient. He no longer suffers, and can move the head easily.

Case 3. An old man, about sixty years of age, lately came to consult M. Dupuytren for an affection of the vertebral column, which, at first view, resembled a dislocation. In this patient, the cervical region was deformed, being convex backward and concave forward. This part was so stiff that it was impossible to make motions, and we also remarked a defective curve of the spine, attended with pain on the least motion and with an immobility in the articulations. It was then thought that there was in this place a disease of the ligaments, which, on extending, might cause a spontaneous dislocation. Leeches and emollient cataplasms were applied. Two moxas were placed on the sides of the gibbosity. These modes, from the pain they excited, the inflammation they caused, the suppuration which attended them, did, in fact, produce relief; the patient could move the head to the right and left: but to be cured radically, he must continue this treatment for a long time.

We will terminate this article by a last case, which although not analogous to the preceding, presents, however, circumstances sufficiently interesting to be inserted in this lecture.

Case 4. *Engorgement of the occipital and vertebral ligaments : paralysis and atrophy of the left half of the tongue.*

A man, thirty years old, whose profession it is useful to know as it had an influence on the cause of the disease, was admitted the last year into Hotel Dieu, in the wards of M. Dupuytren. He was a silk weaver and consequently worked in cellars or in moist and cold basements. These artisans also are subject to rheumatic affections and engorgements of the articular ligaments.

About three years since, this patient was attacked with extremely severe pains in the left side and posterior part of the head : these pains prevented him from moving it either from one side to the other or from before backward, and entirely deprived him of sleep. After five or six days, they changed their place and attacked the upper and left part of the neck. It is important to note this circumstance, as from that time they were less severe, but the motions were impossible. The lateral flexion of the head, and also the motions from before backward, were, it is true, executed by the whole cervical column ; but they took place between the first two vertebræ particularly, and the rotatory motions occur between the first vertebra and the occiput. The disease then was situated there, at least unless we supposed it to exist in the muscles, which, as we shall see, was not admissible.

These symptoms were soon followed with a difficulty of speech, which was at first slight, but soon increased imperceptibly, so that at the end of two months, the patient could hardly make himself understood. He said that the air passed to the left side of the tongue, and that when he wished to say *je*, he pronounced it *ze*. Some pains were felt at the angle of the lower jaw and in the left cheek, but the muscles in this region were not paralyzed.

Another and more extraordinary symptom appeared. The tongue began to diminish in size on the left side, which continued until it was completely wasted. The organ of this part was formed only of folded membranes, which could be rubbed together, and did not feel muscular; it was like an empty leathern purse. The mucous membrane remained entire, but the muscles under it had disappeared. If the tongue was protruded, the right side of it appeared well nourished. The wasting of the left side was more evident at the anterior part and at the centre, but was slight at the base.

It would seem also that the right side had become stronger, a phenomenon analogous to what is observed in other parts of the body when one side is paralyzed. If the tongue was protruded in a straight line, the right side curved, either on account of its increase in strength, or because it was not supported on the left side.

In the first months, the patient was entirely deprived of the power of articulation: but when he was examined, he pronounced as if the tongue was not wasted. He spoke clearly and distinctly. In fact we know that we can talk well with one half of the tongue: that the faculty of speech can exist when the posterior half of this organ, or a third, fourth, or even a stump of it remains. But in order to articulate, he requires time, repeated practice, and constant study, and it is to this exercise alone, rather than to the diminution of the disease, that this favorable result must be attributed, a result which is also obtained after operations in which a part of the tongue has been removed.

M. Dupuytren has carefully studied the changes which may supervene in the sense of taste: in order to this, he dissolved separately in water, four substances, which have different tastes, viz.: *sugar, sulphate of quinine, muriate of soda, and an acid.* These arrangements completed, in order that the experiments should be conclusive, he began them on healthy subjects. They were performed on his pupils: the

tongue being held motionless, a few drops of each were placed on the point: no taste was perceived: whence the professor concluded that they acted but slightly on this part: then the tongue being always held immovable, the sapid bodies were placed on the centre and the base of this organ: the different tastes were perceived perfectly.

The experiments were repeated on the patient, and it was perceived that he did not recognize the taste of these substances by the tip of the tongue, on the wasted side: he tasted them perfectly in the centre, and the nearer they were applied to its base, the more rapidly the taste was perceived. Thus in losing the muscles of the left portion of the tongue, he has not lost the power of perceiving tastes: this observation is extremely important.

The wasted parts then are the muscles. In inquiring what nerves terminate in these muscles, continued M. Dupuytren, we may perhaps indicate the seat of the disease, the cause of the wasting. The tongue, when considered in respect to its size, is the part, or at least one of the parts of the human body, which receives the most numerous and the largest nerves. These nerves are the *lingual*, the *glosso-pharyngeal*, and the *hypoglossal*.

Now these nerves are distributed, the lingual, in the upper face of the tongue, in the nervous papillæ, and the glosso-pharyngeal in the posterior part of the tongue and the sides of the pharynx: the first presides over the taste; the second, said M. Dupuytren, serves rather for motion. If then the lingual nerve were affected, the taste also would be so: if the glosso-pharyngeal nerve were affected, the functions of the pharynx would be changed, and the base of the tongue would have been more or less wasted by atrophy.

The nerve of the ninth pair then remains, the *great hypoglossal*, of which it is useful to know the origin: it arises from filaments situated between the olivary and pyramidal eminences on the sides of the medulla oblongata, and emerges through

the anterior condyloid foramen, on the inner and posterior side of the foramen lacerum. The eighth pair also passes into this point, but it does not seem to be affected with the disease, for the functions of the stomach and intestine have remained uninjured. The nerve of the ninth pair receives and sends off several filaments: some of these branches go to the muscles, which are inserted in the hyoid bone, others to the middle cervical plexus: hence the left side of the neck seemed to the professor nourished a little less than the right side. Finally this nerve, the true motor nerve of the tongue, terminates particularly in the muscular parts.

We now know the different functions of the nerves which go to the tongue; let us see if the atrophy depend on the brain or the nerve.

The severe pains experienced by the patient at the end of the disease, were, as he has perfectly explained, only external. The intellectual faculties and the functions of locomotion, have never been deranged; the parts where the brain sends nerves have never been paralyzed. The cause of the affection does not seem to be in the medulla oblongata; for paralysis, pains, contractions, and convulsions, never occur in those parts to which it sends nerves. Finally, the spinal marrow presents no apparent derangement.

Every thing considered, added M. Dupuytren, I believe in an injury of the nerve of the ninth pair not within the skull, but after leaving its cavity. This opinion is confirmed by the lesion of the occipito-vertebral articulation; the impossibility of moving the head seems to indicate an alteration between the vertebræ, the cause of which is probably a rheumatic affection, and the seat of it the ligaments. The disease commenced on the left side. It descended to the neck on this side: the point of origin then is between the occipital bone and the first vertebra: perhaps, also, even between the first and the second vertebræ. Farther, these diseases are not extremely rare. In the cabinets of the school of medicine, and

the museum of comparative anatomy, may be seen ten or twelve cases of fusion of the first vertebra with the condyles of the occipital bone, with or without displacement.

Thus it seemed, that in this patient there was an acute or chronic inflammatory engorgement of the ligaments which unite these vertebræ with each other, and with the occipital bone : and as the nerve of the ninth pair emerges through the foramen, situated in front of the occipital condyle, this nerve had been compressed or changed in its tissue when it emerged ; lower down, said M. Dupuytren, it has been wasted : hence results the paralysis and the wasting of the left half of the tongue.

The treatment was energetic, for the disease of the occipito-vertebral articulation which was diminished on the left, seemed on the contrary to extend to the right : on this side, the patient felt some pains of the head, which it is true were less violent than those felt at the commencement of the disease on the left side. This treatment consisted in applying scarificators behind the mastoid processes : they were renewed several times, and were then replaced by moxas. These modes were attended with satisfactory results.

This fact is particularly remarkable, from the paralysis and wasting of the half of the tongue : it is the first time that it was seen by M. Dupuytren, and we know not that it has been mentioned by other physicians.

In another lecture, we shall mention the history of consecutive luxations of the vertebræ, and shall describe the anatomical specimens in the cabinets at Paris.

ARTICLE XVII.

OF BURNS.

Causes, Different Degrees, Complications, Anatomical Characters, and Treatment.

It is by reviewing the clinical lectures of the celebrated surgeon-in-chief at Hotel Dieu, and the labors to which he has devoted himself with unexampled zeal for twenty-five years, that we can form an exact idea of his numerous contributions to modern surgery. The subject we shall speak of in this article is one of those which he has treated most happily.

Injuries produced by burns were badly defined, as to their different degrees : their complications were but slightly studied, their anatomical characters unknown, and their treatment was empirical ; but their practical theory received great modifications from the observing talent of this learned professor. Hence, his views on this affection are now generally adopted. For many years, M. Dupuytren has taught them in a series of lectures, with all the developments required by so interesting a subject. These lectures we shall now publish, adding new remarks which have been suggested to the professor by recent cases, since the commencement of this course of lectures.

Every year, said M. Dupuytren, but particularly during severe winters, and whenever the cold is extremely intense, the surgical department at Hotel Dieu presents a great number of individuals affected with more or less serious burns. Old women, clothed in rags, return in the evening to their close, narrow, and dirty garrets, after taking as usual their common allowance of wine or brandy. They place under them, or

their bed-clothes, brasiers and chafing dishes filled with burning coals or embers: the heat, the alcohol, and the carbonic acid gas, puts them to sleep, or stupefies them; the fire communicates to their clothing; and often, when awakened, or when assistance comes, it has already made such progress that the whole surface of the body is one wound. Porters and domestics, obliged to sit up late, often fall asleep, and experience the same accidents. Old men, while leaning against stoves, frequently fall into a kind of coma: their garments burn, and also the skin, the muscles, and the aponeuroses, even to the bones. Other individuals, when overcome with wine or fatigue, fall asleep in a chair, near the fire, and fall into it. Those unfortunate persons who are affected with epilepsy, have a paroxysm, and fall into brasiers or kettles of boiling water, or hot fat, and remain there a greater or less length of time, and are horribly mutilated. Young children, when imprudently left alone, sometimes approach too near a blaze or a light, and are scorched by the flame. Coopers, who are employed in cellars to inspect casks filled with spirits, set fire with their lights to the gas which escapes from them, and become a prey to the general conflagration. Sulphuretted hydrogen gas accumulates in foul and badly-aired privies; the first person who enters with a lamp inflames it; and his clothes and body are more or less severely burned. Finally, attempts at suicide by charcoal increase considerably the number of burns: the unfortunate people who propose this, place themselves near the fatal brasier, or place this near their bed, and when convulsions commence, they roll upon the burning coals, and are frightfully burned. If we add to all these causes a multitude of others which are also accidental or unforeseen, as conflagrations, or those arising from the profession exercised by so many workmen, as forgers, founders, glass-blowers, brasiers, &c., we shall not be surprised at the prodigious number of burns which are annually presented in the hospitals at Paris, and particularly at Hotel Dieu.

The organic lesion, termed a burn, combustion, &c., continued M. Dupuytren, is always the effect of the action of intense caloric on living tissues. It is to the nature of the cause that it owes its peculiar characters, which cannot be confounded with any other organic lesion. These are always the same, whatever may be the affected part, and participate in the nature of wounds, of inflammation, and of disorganization.

But these effects of the action of caloric differ very much in respect to their intensity or their gravity, according as they are caused by the radiation of heat at variable distances, or by the direct action of the flame, which accompanies the combustion of a great many bodies, or by the immediate application of these burning bodies.

The pathological lesions resulting from the radiation of heat are more or less serious, according to the intensity of the heat, and the duration of its action. When the heat is moderate but continued, it thickens the epidermis considerably, hardens the skin, destroys its sensibility, and gives it a more or less deep brown color: such are its effects upon persons habitually exposed by their profession to the sun, or to vast furnaces, as are blacksmiths. We know that the latter even handle red-hot iron with impunity, for several moments, with their rough and horny hands. It is also this natural or artificial thickness of the epidermis, and the want of sensibility in the skin, which enable pretended fire-eaters to support a very great degree of heat.

When the heat is more intense, it causes the skin to peel off, in irregular marbled layers, and also the epidermis to crack and break: hence result ulcerations, which are difficult to cure: this is observed on the anterior face of the legs of old men, who are always sitting near large fires, and on the legs and thighs of females who constantly use furnaces. Finally, when still more active, either from the quantity of caloric sent out by the burning body, or from its nearness, we may see all the phenomena which characterize the first, and even the

second degree of the burn. We have seen females, added the professor, who shivering with cold, had put under them chafing dishes which were too hot, have in a few hours, the internal and posterior face of the thighs covered with ampullæ.

Exposure to the sun sometimes produces severe burns, especially in warm countries. There are several cases of individuals mentioned, who having fallen asleep in the open air, have had different parts of their body burned by the heat of the sun's rays. A violent inflammation was quickly followed by gangrene, and they died in four or five days.

As to the flame, continued M. Dupuytren, it not only burns instantly, like bodies directly applied to the parts, but also it inclines the animal substances to take part in the act of combustion, of which it is the product. When exposed to its action, they dry quickly, harden, and consume, producing a new flame, which is added to the first, increases its activity, and extends its ravages. We know with what extreme rapidity burning garments destroy very deeply the parts they cover: the lesion is often extremely serious, and death is generally the consequence of it. We not unfrequently see the entire bodies of individuals who are intoxicated or apoplectic, or of young children, who are unable to assist themselves, consumed in a few hours.

It is to this kind of causes that we must refer, said the professor, the burns produced by the combustion of certain gases, and particularly of hydrogen gas, by the explosion of steam boilers and the detonation of gunpowder. These gases generally produce only superficial but very extensive burns, because they act instantaneously on large surfaces. Sometimes, however, they penetrate below the derma.

The degree of the burn will also vary according to the physical and chemical qualities of the bodies which are burning or are saturated with caloric, which are immediately applied to the living parts, that is, according to their peculiar nature, their density, their capacity for caloric, and the facility with

which they part from it. Thus all boiling liquids do not burn with the same power, because they do not all boil at the same temperature. Hence the burning power of fatty bodies, as broth, oil, fat, tallow, &c., is much more energetical than that of water. But another cause of this difference is that the first from their nature, adhere to the skin, on which pure water merely trickles down. If it be true that strong acids and concentrated alkaline solutions, when heated to the boiling point, produce injuries much more serious than other liquids, it must doubtless be attributed to the fact, that becoming more dense, they then acquire the power of absorbing a greater quantity of caloric.

Solid bodies cause deep burns if their combustion be very rapid, as is that of phosphorus, sulphur, and resins generally : in the contrary case, the intensity of their effect is proportional to their degree of heat, the duration of their contact, the sensibility of the tissues, &c. Other things being equal, the burn is less deep when parts continually in contact with the external air are affected, than when it injures those parts which are always covered and the epidermis of which is very thin.

It follows, from our statements, said M. Dupuytren, that the general effects of the action of fire, according as it is feeble or instantaneous, powerful or prolonged, excessive or very long continued, are either a simple inflammatory irritation, which in itself tends to resolution or an inflammation, which must necessarily terminate in suppuration or finally in the complete destruction of the vital powers, and in the death of the parts. It is under this general point of view that authors have considered these lesions in order to classify them and divide them into a greater or less number of degrees. Thus some, as Fabricius de Hilder and Boyer, count the three degrees which we have just mentioned : others, as Heister and Callisen, describe four : one writer of the present time admits but two, and divides all burns into burns with inflammation or with immediate disorganization.

In all these divisions, regard has been paid only to the intensity of the symptoms of the burn itself, considered generally, leaving out of view the nature of the organs affected, of the tissues attacked or destroyed. Nevertheless, it is evident that the heat always affects the skin first, and that its effects then extend to variable and successively greater depths: that the three orders of phenomena, which we have mentioned above, are in direct ratio with this depth, and consequently that if we wish to establish a classification of burns upon exact principles, we must take for a base the different kinds of organs which have been exposed to the action of heat.

For these reasons, continued the professor, we adopted long since another classification, and divided burns into six degrees, which are thus characterized, first, erythema or superficial phlogosis of the skin without the formation of phlyctenæ. Second, cutaneous inflammation, with the loss of the epidermis, and the development of vesicles filled with serum. Third, the destruction of a portion of the papillary body. Fourth, the disorganization of the whole dermis to the subcutaneous cellular tissue. Fifth, the formation of eschars, of all the superficial parts, and of the muscles, to a greater or less distance from the bone. Sixth, the carbonization of the whole thickness of the burned part. The first degree is generally produced by the action of the radiating caloric, or by burning vapors, or finally by the application of bodies more or less hot. The parts then present a vivid redness, which is not circumscribed, analogous to that of erysipelas, which is momentarily removed by the pressure of the finger: the patient feels a sensation of scorching heat, which continues during the whole of the disease. Frequently in a few hours, but always after a few days, the redness, heat, and pain disappear, and the inflammation terminates by the desquamation of the part.

However slight the burn may be, in this degree, when it attacks broad surfaces, the pulse sometimes rises and becomes frequent, the tongue reddens, and the phenomena of gastro-

intestinal irritation develop themselves. When it is situated in the head, the irritation may extend to the encephalon, and cause wakefulness, delirium, convulsions, coma, and even death.

The second degree always supposes a more energetic cause, the action of which has continued longer than in the preceding case. A severe, sharp, and burning pain is felt, and sometimes at the same moment, but more frequently after a few hours, there forms on the burned surface one or several phlyctenæ which are filled with a clear and limpid serum: the pain then becomes intense. The phlyctenæ burst or they are opened: the serum is discharged; the detached epidermis dries, or some days after falls off in folds or scales, showing the rete mucosum covered by a newly formed epidermis, which is still reddish, thin, and light.

Sometimes the epidermis, instead of forming vesicles, is torn and detached from the rete mucosum, which remains exposed. This accident is attended by severe pains and is always followed with a slight suppuration. But after a time the denuded surface dries, and a redness only remains, which finally disappears, so as to leave no trace of it.

The cauterization of the rete mucosum and the papillary surface of the derma, which constitute the third degree of the lesions to which we are now attending, is indicated by the presence of thin gray, yellow, or brown spots, which are insensible when touched gently, but if we press on them, a more or less severe pain arises below them. They are formed by the dead rete mucosum. The phlyctenæ, which cover the points frequently disorganized to this extent, usually contain a serum, which is brownish, lactescent, or deeply colored by the blood: this appearance becomes from the first an useful mode of diagnosis. In these cases, the eschar is sometimes detached in a mass at the common period, so as to leave exposed in the places covered by the phlyctenæ more or less extensive but superficial ulcerations, the cicatrices of which, although not in bands, always remain apparent, on account

of the white, thick, and shining layer, which appears in the place of the surface of the skin which was destroyed. To this degree belong most of the burns caused by gunpowder, the eschars of which are colored black, by the materials which compose it, and hence are easily distinguished from those produced by other causes.

Under whatever form this burn first appears, the pains which are relieved during the first twenty-four or forty-eight hours, re-appear in a few days: an eliminating inflammation develops itself, the eschar forms, detaches itself, and falls off, and the wound soon dries, leaving behind a white cicatrix.

We must here lay down as a principle, that in all burns the pain is always severe; but it is much more intense when only the surface of the skin is burned, than when it is destroyed more deeply; and this fact is important in the prognosis.

When a body in ignition is applied to the parts for a considerable time, a severe pain is felt, but this pain ceases as soon as the cause of the burn is removed. The epidermis, the rete mucosum, the skin, and sometimes also a thin layer of subcutaneous cellular tissue, are destroyed, and a deep yellow or blackish eschar forms, which is dry and insensible, and is hard and tense in proportion to the depth of its color. The healthy skin, which borders it, is wrinkled, and the radiated folds which it forms around the burned part, indicate its degree of horny hardening. In three or four days, pains are felt; a circle of inflammation appears around the eschar, which is thrown off generally from the fifteenth to the twentieth day: the base of the wound looks to the subcutaneous cellular tissue: the suppuration from it is very abundant; and fleshy granulations appear in abundance. These are the characters of burns in the fourth degree.

But we must here remark a phenomenon, which is peculiar to burns, and which no other wound, with loss of substance, presents in the same degree: this is the power with which the

edges of the wound are drawn towards the centre. However remote the edges may be, they constantly tend to touch each other. It is this tendency of the organic power which causes all the bad effects frequently resulting from cicatrization, besides those frightful deformities, and the impotence or uselessness of the affected parts, but which may always be prevented by proper treatment. These results never occur when the burn affects the posterior part of the trunk, because the motions of flexion, which are the most natural, prevent the cicatrix from forming by approximation. The same observation applies to the limbs, according to the parts affected.

Burns in the fifth degree hardly differ from the preceding, except that they affect parts situated more deeply, and may be followed by extremely serious symptoms. The eschars, which include aponeuroses, muscles, and sometimes vessels and nerves which have resisted the destructive action of the fire, are sonorous, dark, friable, and require a much longer time to be detached. When caused by boiling liquids, they present a grayish, insensible mass, which can be pressed by the finger and not occasion much pain. Suppuration is much more abundant, and the cicatrix in which the motory organs are interested, remain without form and adherent, and entirely lose their motion.

The characters of the sixth degree are distinguished more easily. The limb is then charred on its surface, hard, insensible, sonorous, easily broken by attempts to bend it, and the eschar, when detached, leaves behind a stump which is more or less irregular, according as the fire has affected the different organic elements at different heights. Messrs. Roche, Sanson, and Begin, in their excellent works, mention the case of a young man, who in walking through a foundry, placed his foot in the trench through which the fused iron was about to pass: the melted metal rolled over it, and when the limb was withdrawn, the foot and lower part of the leg were destroyed.

He scarcely felt the pain, and did not at first perceive the horrid mutilation.

Such is the true and scientific theory, admitted and developed by M. Dupuytren, and which rests on the nature of things and the observation of facts, and which is now generally adopted. This classification differs essentially from those hitherto proposed, as it distinguishes the shades of the disorganization of the skin and subjacent parts, which most authors had confounded in their third or fourth question: as the six degrees, as we have stated above, are divided according to the depth of the alterations in the living tissues: and finally, as each of them may be denoted by those peculiar phenomena which it is so important to distinguish in practice.

We must not however believe, added M. Dupuytren, that in these different degrees of burns, we find only the series of phenomena peculiar to each of them. On the contrary, they rarely exist alone, and beyond the simple erythema they may be complicated from the most serious to the slightest. Thus, from the point where the eschar is deepest, where even it may extend to the bones and the entire thickness of a part, it gradually becomes superficial, until finally only the rete mucosum and the epidermis are affected. The principal eschars are often surrounded with slighter eschars: often also between or near the disorganized parts, only phlyctenæ of different sizes exist, and beyond them, as also in the spaces left free by the deeper lesions, we see only the erythematous blush of the first degree. Finally, in extensive burns we commonly find all the degrees in different parts of the body.

We must also remark, continued the professor, that the characters of these degrees of organic lesions produced by burns, although well marked, are nevertheless, in most cases, difficult to distinguish soon after the accident. At the same time that caloric has disorganized the parts on which it acts most violently, it always affects the tissues lying directly under them, so that although not entirely deprived of life, they cannot

support the inflammation which is afterwards developed there, and are consequently destroyed. Hence in most cases, burns appear, when the eschar comes off, both deeper and broader than they were at first. From these facts we shall deduce a consequence very important in a legal point of view : that in burns of the third degree, and beyond this, before giving an opinion as to their seriousness, we should always wait until the eschars have begun to fall off, and the extent of the injury is finally fixed.

Let us now follow M. Dupuytren in the examination of the varied phenomena observed during the course of these diseases. Each of the different degrees which we have established, said the professor, according as it occupies a small space or a large surface, may from different circumstances proceed as a purely local affection, or cause general symptoms, more or less dangerous to the life of the patient. The latter are the immediate result of a general irritation, caused by the action of caloric, or the secondary effects of inflammatory reaction, of suppuration, and of wasting, which succeed each other in the course of burns, and hence have been divided into primitive and consecutive symptoms. Let us now attend successively to each.

The direct and severe pain which necessarily attends the action of a concentrated heat on the animal parts, may be so intense as to cause instant death. We have seen instances of this. The encephalic nervous system is then the seat of a violent irritation. Most of the phenomena of congestion and engorgement of nearly all the organs in the great cavities are seen. This prompt termination occurs particularly in children and nervous females, more rarely in adults, and seldom in old men. It cannot be attributed to inflammation or to any other disease which could be aggravated by the burn : and is *death from an excess of pain*. M. Dupuytren thinks that death may be caused by too great a loss of sensibility, as by too great a loss of blood in hemorrhages. The patient is then either

very much excited or depressed, and in this latter state he generally expires.

But if the irritation of the skin which extends to the nervous and consequently to the circulatory system, is not intense enough to cause immediate death, other phenomena appear: sometimes an excessive agitation, a want of sleep, spasms, convulsions, and intense fever, supervene: sometimes the patients fall into a deep state of stupor and collapse: the pulse is small and quick; the skin cold and pale in the sound parts; the respiration is slow; the limbs are motionless; questions are unnoticed, or receive but slow and imperfect answers. This kind of stupefaction terminates most commonly by a rapid death, and sometimes by general reaction.

When the burn is superficial, and does not extend beyond the second degree, if it occupies but a small surface, but particularly if the subject be very irritable, we do not see the formidable symptoms mentioned, but a general reaction occurs, similar to the phenomena of erysipelas: the pulse becomes frequent and strong; the skin hot; and the irritation of the digestive organs is denoted by the redness and dryness of the tongue, thirst, nausea or vomiting, want of appetite, &c. These symptoms generally yield speedily to appropriate remedies.

In many cases of deep burns, when existing in the third and fourth degrees, no particular symptoms appear between the time the accident happened, and when the process of elimination is commenced. But at this period, which generally happens the fourth day, the inflammation causes pains which are more severe, as the lesion affects parts where the derma is more compact and more abundantly provided with blood-vessels and nerves. If large surfaces are affected, all the symptoms of nervous and gastric irritation, which we have stated in burns of the second degree, supervene, but with much greater intensity, and sometimes are so severe as to cause death.

We have remarked that the respiration of those injured, is often very laborious and difficult. These phenomena depend

on the severe primary affection of the circulation and respiration, and on the secondary development of an intense bronchial irritation, or on a considerable pulmonary engorgement. But this is not all. Patients who are fortunate enough to escape all these symptoms, have also others to pass through. Whenever the burns are very broad and very deep, and when consequently after the eschars come off, they give rise to very extensive wounds, the abundant and long continued suppuration gradually exhausts the strength, causes a constant wasting, and finally an incurable marasmus. This period of suppuration and of exhaustion in burns, is characterized by phenomena, similar to those which attend the last stages of all chronic diseases.

Among the most serious complications of burns, we must mention the appearance of erysipelas, and particularly of phlegmonous inflammation. All the phenomena which mark this frightful disease, are added to the more or less serious symptoms of the primitive injury: and if their progress be not arrested, purulent abscesses form, the pus burrows through the cellular tissue in the interstices of the organs: this is followed by extensive destruction of the skin and excessive suppuration, and amputation the only means of safety, generally presents but a trifling chance of success. It follows, then, from these facts, that when the burns are too extensive or too deep to cause only local symptoms, the life of the patient may be endangered successively at four different periods, which M. Dupuytren terms the period of irritation, period of inflammation, period of suppuration, and period of exhaustion.

If the reader will compare the luminous doctrines of M. Dupuytren, which we have briefly mentioned, with the writings of authors before him, he will appreciate still better his numerous and important ameliorations of this interesting part of surgical pathology. His eminent talent of observation could not be confined there: it belonged to him also, after recognizing the relations of sympathy between the external tissues and the

organs of the great cavities, to define the nature of the consecutive injuries of the latter, and thus to explain the cause of those general symptoms with which most of the patients are affected. His numerous necroscopic researches have thrown the greatest light on this subject

Thus it has been demonstrated by post mortem observations, that when an individual has perished in a general conflagration, in the midst of flames, or a few moments after being rescued from them, inflammation has not had time to develop itself in the intestinal canal, but we there find marks of a violent congestion. Not only the mucous membrane presents more or less extensive layers of a very vivid red, it is not only injected and gorged with blood, but its cavity also contains a certain quantity of this liquid, which has come there by exhalation. The brain is very much injected with blood: the serum in the ventricles has acquired a reddish tint, which is also discovered in that which moistens the cavities of the pleura, of the pericardium, and of the peritoneum. The bronchi also contain a bloody mucus: their mucous membrane in different points is of a bright red, and the capillaries are injected. It seems that the blood propelled internally by a general and sudden irritation, has made an effort under the influence of the excessive stimulus of the heart and of the vascular apparatus, to escape through all the free pores of the inner surfaces.

If some days have elapsed since the accident, if the patients having resisted the first impression of the fire, die from the third to the eighth day, in the second period, from the violence of the inflammatory reaction, after presenting, during life, all the symptoms of severe visceral irritation, we find, on opening the bodies, all the distinctive marks of gastro-enteritis, usually attended with inflammatory appearances of the encephalon and the lungs. These last organs are often affected with latent phlogoses, already so well described by Stoll, and which are much more serious, because at first they escape the notice of

the physician. Finally, if the patient has died at a still more remote period, during the course of suppuration and from exhaustion, we find in the viscera and particularly in the digestive apparatus, deep alterations which prove the long inflammation with which they have been affected; the mucous membrane presents more or less vivid red patches and more or less deep ulcerations: the mesenteric ganglions are generally engorged, &c. From the explanations into which we have entered, it is easy to understand, said M. Dupuytren, on what basis must be founded the prognosis of the injuries of which we are speaking. It is evident that this prognosis should be deduced from their breadth, depth, situation, the nature of the causes which has produced them, the age, constitution, and temperament of the patient. Thus a burn occasioned by a poisonous caustic, capable of being absorbed, is more severe than that produced by any other cause. Vigorous, sanguineous and young patients are more exposed than others, to the symptoms which may result from an excess of inflammation. A burn, even if superficial, which attacks a part or an organ of a delicate texture, will be more destructive than one affecting a less important part, which can resist its effects more easily, either on account of its natural structure or from a disposition acquired by labor or habit. Vesication, rubefaction, and burns in the third degree, leave but slight or no scars: while those in the fourth degree, which embrace the whole skin, if left to themselves will give place to bad cicatrices and adhesions, especially if they affect the eyes, the face, the neck, the hands, the feet, &c., because that they, as we have already mentioned, possess in the greatest degree the tendency which all wounds of the integuments have, to contract and close by the approximation of their edges. Thus we often see fingers bent upon the back of the carpus and blended with it: the whole hand fixed on the fore-arm, the fore-arm on the arm: the foot turned in various ways, forming only a shapeless mass which adheres to the leg: the head drawn violently against the

shoulder, the nape closely attached to the back, the chin pulled down to the sternum; the ears united to the corresponding surface of the head, &c., &c. The disorders caused by burns in the fifth degree, are generally very fatal, and this is readily conceived when we examine the number and uses of the organs they affect. By the destruction of the tendons and muscles, the limb loses the use of its functions: from the thickness of the disorganized tissues, an excessive suppuration follows and threatens the patients with exhaustion: by exposing the bony surfaces to the external air, these are liable to mortification: by opening the synovial capsules of the joints, these cavities inflame: and if an articulation of the first kind be affected, the most favorable issue for the patients is to be cured by the ankylosis or the amputation of the limb.

You have now before you a patient who is placed in this dilemma.

Case 1. *Burning of the knee in the fifth degree. Lesion, and abundant suppuration of the articulation.* This is a shoemaker, whom we have already mentioned several times. On his entrance at the hospital, he presented on the inner face of the left knee, a black, hard, sonorous, and insensible eschar, as large as the palm of the hand, and which appeared very deep. This man stated that a kettle of boiling water had been upset upon the part. It was easy to see at a glance that this assertion was extremely improbable: if this had been the cause, the burn would not have been so circumscribed: the liquid, in spreading, would have left marks of its action over a greater or less surface: they would also be seen in different parts of the leg, and perhaps also on the foot. Why should this man conceal the truth? We know not: but after numerous inquiries, we learned that he sat down and went to sleep, embracing closely with his knees an earthen pot of boiling water. Probably he was intoxicated, and was not awakened by the pain, until the knee was burned deeply. We should mention that the clothing between this part and the

vessel, remained uninjured. The cause of this cure then should be placed among burns produced not by the direct application of a burning body, but of a body powerfully saturated with caloric.

The eschar having been thrown off, we saw that it extended to the patella and even within the joint. In fact, you have seen an abundant suppuration of grayish, grumous, and fetid matter, and a discharge of pus mixed with a certain quantity of synovial fluid. However, you have been struck with the improvement in his general state and in the injured parts. Suppuration had diminished much, but the disease had not lessened. But this improvement was not permanent, and we have mentioned it. The patient grew more and more feeble: we have yet a feeble hope of his cure by an ankylosis of the joint: but it is more probable he will die from the inflammation and the suppuration in this cavity, as amputation seems almost impracticable. Finally, this operation is an inevitable consequence of a burn in the sixth degree.

A very extensive burn, in the first degree, often causes death immediately, or a few hours after. But after the first twenty-four or forty-eight hours, resolution commences, and the danger is passed. We shall mention instances of it. When the burning body was very hot, and its application has been very rapid, it may cause a kind of swelling of the epidermis: if it occupy a large surface, the burn is extremely severe. This sometimes happens in using too hot a bath. The mother of one of our poets died about two years since from an accident of this kind.

In burns of the second degree, the same accidents are to be feared: but the inflammation of the internal organs is more imminent, the danger of their development continues longer, and does not cease until desiccation begins to take place. We must here recal an important fact, which should never be forgotten when forming an opinion as to the probable consequences of a burn; it is that in all cases, women and children,

who are nervous and irritable, are more affected by the pains inseparable from these injuries, than individuals whose sensibilities are blunted, and who are of a sanguineous temperament, as adults and old men.

In the third degree, the causes of pain and irritation succeeding from the moment the disease appears, until it terminates, the patients are exposed not only to all the dangers presented by the first two degrees, but also to all those which may arise from the period of the eliminatory inflammation; in the first case, they are liable to a sudden death, caused by excessive general irritation, to a primitive gastro-enteritis, to nervous symptoms, as tetanus, spasms, and convulsions: in the second, to the same phenomena, and to all the symptoms of a violent secondary gastro-intestinal inflammation. Besides, the danger of the burn is proportional to its extent; and when a large portion of the skin is affected, say two or three square feet for instance, it is most generally fatal, at the period of the eliminatory inflammation of the eschars, or at the period of suppuration: but the formation of the cicatrix is attended with none of the bad symptoms which mark the next degrees.

In burns of the fourth degree, the irritation and pain continue only as long as the cause acts, but the patients may die during this time: if life continue, they may sometimes become completely stupid: an icy coldness affects them, and they die some hours after the accident. Sometimes the patients revive, and continue from the fifth to the ninth day, in consequence of the inflammatory reaction. Finally, sometimes the excessive suppuration, the length of the disease, an attack of hospital gangrene, or of a malignant fever, exhaust them, and cause death. Burns in the fifth degree, even when existing to a small extent, are always dangerous, on account of the reaction which invariably supervenes. But these cases are much more dangerous, because they excite in the whole system a derangement which frequently cannot be remedied: a burning fever

appears ; and diarrhea, redness of the tongue, and vomiting, soon indicate a gastro-intestinal phlogosis.

Burns also present various degrees of danger, according to the organs affected. If, for instance, the eye be burned, and the disease does not extend beyond the conjunctiva, a severe ophthalmia supervenes, passes through its periods, and terminates in many cases by leaving films on this membrane. But if it be deeper, the cornea may lose all its transparency, the eye itself may be primitively or consecutively entirely disorganized. When some parts of the cornea retain their transparency, said M. Dupuytren, the patient's sight may be restored by forming an artificial pupil, as was done by me in 1811, in a man whose eyes were burned with gunpowder.

We must now relate some instances of the numerous facts we have stated : they will justify the principles deduced from them.

Case 2. Burns in the fifth and sixth degrees over the whole surface of the body, caused by the clothes taking fire. Death during the period of irritation. A child, three and a half years old, named Leroy, of good constitution, was brought to Hotel Dieu, in March, about eight o'clock, P. M., having been rescued from a chamber which was in flames. Its mother was a washerwoman, and had kindled a large fire to dry her clothes, and placed the child near it, and left it alone. Its clothes took fire, which probably communicated to the linen, and it was soon surrounded with flames. Its cries were distressing. The neighbors soon ran in, and beat down the door : the female who had risked her life to save it, brought it to the hospital herself. It presented a painful sight : it was burned from head to foot, and but a few scorched rags remained upon it : sometimes it was silent, and uttered only plaintive sighs : sometimes it was aroused, and sent forth piercing cries.

Except upon the toes and a small portion of the feet, which were protected by the shoes, not the least vestige of healthy

skin remained upon the whole body. On the back, the neck, the upper and anterior face of the chest, was a burn of the first and second degree: the hair and the eyelids were consumed, the cheeks were covered with eschars, the arms were charred, the skin lifeless, black, broken in several places, and ready to break in other parts: the thighs and the haunches were scarred much more extensively and deeply than the cheeks: the fingers were retracted and incapable of moving: the genital organs nearly destroyed.

We had no hope of the life of this young patient, and its death was certain. However, the remnants of the clothes were removed from the neck and shoulders, and it was placed in a warm bath. The respiration, which was very laborious, seemed to become more free. It remained in the bath an hour: it revived, complained of a lively heat over the whole body, and called loudly for its mother. It was then covered from head to foot with blotting paper spread with cerate, and was wrapped in a fine cloth. At eleven in the evening it fell into a deep slumber, and the next day, at two, A. M., six hours after the accident, it died.

Autopsy. The cadaver appeared to be that of a child which had been exposed to the action of a furnace at a very high temperature. The scars were too numerous to be counted. The arms were nothing but eschars; they embraced the muscles, nerves, tendons, aponeuroses, and bones. Some of the finger-joints are open: those of the thumbs, elbows, and shoulders, are real, and contain effused blood. The veins and the arteries have no blood in them. On the lower limbs, also, the burn extends to the bones: on the thighs, it affects only the muscles. It would be impossible to tell the child's sex from inspecting the genital organs: they are entirely destroyed, and this region is very much disorganized. In the skull, we remark a peculiar dryness of the membranes: the ventricles contain bloody serum, and the cerebrum is injected. The same degree of dryness is seen also in the pleuræ and the

pericardium. The lungs are gorged with blood, and the bronchi are of a bright red. The aspect of the peritoneum is the same as that of the pleuræ, the pericardium, and the meninges. The stomach and the intestines have a distinct redness. All the vessels are very much injected, the liver contains much black blood, the bladder is distended with a great quantity of turbid urine.

Case 3. *Burns of the first to the fifth degree of nearly the whole surface of the body by the clothes taking fire. Death by asphyxia, during the period of irritation.* The fourth of February, about eleven, P. M., a portress, twenty-seven years old, who was in the fourth month of pregnancy, had placed under her feet a brasier of lighted coals. She was fatigued, and fell asleep: during this time, the fire communicated to her clothes, and she did not awake until most of them were consumed. She immediately opened the lodge, ran into the court, and thus increased the violence of the flames. Hence resulted burns of almost every degree. When she entered at Hotel Dieu, her clothes consisted of some half-burned or carbonized rags, which adhered to the face of the body. The shoes and the feet had alone escaped the action of the flames: the face was injured much less than the rest of the body. The eyebrows and eyelids were destroyed. Most of the surface of the body presented phlyctenæ, (second degree,) or was deprived of its epidermis and of the rete mucosum, (third degree.) This was the state of the anterior face of the legs and of nearly the whole belly and thorax, which appeared of a bright red. In other parts, the burn existed in the fourth and fifth degrees: here the eschars were whitish and soft; there they were hard, and of a brick red: the left thoracic extremity, and the posterior face of the two thighs, presented one or the other of these alterations in nearly all their extent.

We removed from this unfortunate female as speedily as prudence would permit, the remnants of her garments, and she was placed in a bath of twenty-four degrees. The instant

she was placed in it, she experienced a very distinct chill ; but she was soon better ; and then complained of intense cold, which she attributed to the water with which the flames were extinguished. This chill lasted about half an hour. When it ceased, she seemed drowsy. On leaving the bath, she was covered with fine linen, spread with cerate, and enveloped in warm cloths. An opiate and some whey were administered. She remained tranquil during the day, and seemed to enjoy a little sleep.

The next day, from the immobility of the features, and the almost tetanic tension of all the muscles of the face, M. Dupuytren observed, before he had examined her, that nearly the whole of this patient's body was affected with the burn. He prescribed several new baths : but she disliked them so much, on account of her weakness, and the pains she felt when it was administered, that only one was given. The potion was continued.

The day passed without much pain : she was constantly sleepy, but her intellectual faculties were unimpaired. In the evening, the dressing was renewed. During the night she was very much disturbed and restless, but there was, however, no delirium.

On the visit the second day, she was considerably exhausted, she had some cough, and could not swallow. The attempt at deglutition of a few drops of liquid was attended with choking, which led us to fear suffocation. Some moments after, speech returned, and the intellectual faculties continued until eleven, A. M., thirty-five or thirty-six hours after the accident, when she died by asphyxia, that is, by the cessation of the functions of the respiratory muscles. As the fetus of this female was only four months, and consequently not viable, it was entirely neglected.

Autopsy, twenty hours after death. This cadaver was somewhat stiff, the skin was scarified, hard, and coriaceous in almost every part. The eschars were white in the anterior

part of the trunk, black in the loins and on the back : at the posterior part of the thighs, the skin, the cellular tissue, the enveloping aponeurosis were destroyed : the muscles in this region were red and firm, but were unchanged. The hairs on the pubis were burned, the skin of the external labia was charred.

The pia-mater was very much injected, the arachnoid membrane was uninjured, but dry, the cerebral substance was firm and also dry. The lungs had no adhesions, but were gorged with blood, the bronchi were filled with mucus, and their mucous membrane was very much injected. In the left cavities of the heart there was hypertrophy to a very great extent.

In the stomach and near the pylorus were numerous small and nearly miliary ulcerations : some were as broad as a bean, and presented a grayish base. The whole of the ilium was of a very deep red. The liver and spleen were engorged : the peritoneum was very dry.

The bladder contained some turbid and whitish urine, and some like this was found in the pelvis of the kidneys. The uterus, which had ascended three inches above the pubis, contained a well formed fetus about seven inches long. The heat continued remarkably in this region. There was a separation of three lines between the pubis ; the sacroiliac articulations were also relaxed and movable.

Case 4. *Asphyxia by charcoal. Burns in the first four degrees in several regions, occasioned by boiling broth, and by the brasier. Death during the period of reaction.* Bisson, forty years old, epileptic for several years, was sitting near the fire, when a paroxysm supervened, and she fell upon a pot of boiling broth. The left side of the face, and the whole of the right hand were burned in the first two degrees : the left elbow and the upper and left side of the chest, which came in direct contact with the brasier, were burned in the third and fourth degrees. The burns in the first degree were characterized by an extremely vivid redness, that of the second, by nu-

merous phlyctenæ: and those of the third and fourth, by broad and deep eschars. Unfortunately, all these burns were very extensive: the patient was extremely anxious: she cried very loudly from acute pain. She was continually agitated with very intense convulsions. At times she was delirious. (Copious bleedings, opiates, diluent drinks, and strict diet: dressing with fine linen, perforated and spread with cerate: lint and cataplasms, were prescribed.) For three days the patient was tolerably well: the fourth, all the symptoms were increased, the pains were insupportable, delirium was almost constant, erysipelatous redness appeared over all the body; tongue red and dry, extreme anxiety: she was again bled, but the symptoms continued, and the patient died during the day.

Autopsy. The pia-mater and the cerebrum presented some red points: the gastro-intestinal mucous membrane was inflamed in several points, and the inner surface of the veins was remarkably red.

Case 5. *Burns at different degrees by the garments taking fire. Tetanus produced by inflammatory reaction. Death.* Roger, thirty-three years old, a printer, came to Hotel Dieu, affected for two days with a broad and deep burn, produced by the burning of his clothes, while he was intoxicated. Assistance was rendered to him, and the fire extinguished. The burn affected the inner, outer, and posterior sides of the thigh, extending from the groin to the ham. Most of the skin of this part had sphacelated, and the rest was dry, hard, and its color was of a pearly white. Around the eschar, the intensity of the burn diminished, and we distinguished the different degrees which formed a zone about two and a half inches broad. The pulse was excited, the skin was cool. Nevertheless, he was bled, and emollient cataplasms were applied to the eschars. The fourth day after the accident, the febrile reaction was more marked; (baths, opiate cataplasms, and calming potions were ordered.) The sixth day, the eschar had softened, an inflammatory circle surrounded it on all parts,

and fleshy granulations appeared : but the patient experienced the most severe pains : and he could not sleep : the pulse was very frequent. The ninth day, there was pain in the forehead, and the tenth these pains were extremely severe. The jaws were closed : the patient complained of difficulty in moving the neck, and of stiffness in the right arm : the belly was painful, tender on pressure, the skin warm, the pulse frequent ; (venesection, fifteen leeches behind the ear : in the evening, an opiate with fifteen drops of laudanum.) In dressing the patient, the utmost precautions were taken to exclude the air, as much as possible, from the wound. The eleventh day, the patient was more sick and restless, the jaws are more stiff, and this stiffness affected also the muscles of the neck, and the left arm began to stiffen. The jaws are separated with difficulty. The perspiration is abundant, (the patient is bled to syncope, a bath of three hours, opium in enemata and by the mouth, embrocations of laudanum on the masseters and the muscles of the neck were ordered.) The twelfth day the neck is bent back, the muscles of the pharynx are contracted, there is aphonia occasionally. The thirteenth day it is difficult to introduce a spoon between the jaws, the trunk is bent backward and in an arch, resting on the heels and neck : perspiration is abundant ; the pulse is corded and very frequent, no delirium. (The wounds are dressed with opiated cerate : six drops of laudanum are given every two hours, the embrocations on the lower jaw, neck and belly, are continued.) The suppuration is slight, the granulations are vermilion red, but the pain in the muscles of the neck is increased on the least pressure, and it is very severe also in the epigastrium : the respiration is difficult : the symptoms become more and more alarming. (Twenty-five leeches to the posterior part of the neck.) The patient has continued hitherto to urinate and to pass the feces : he preserves his intellectual faculties. The pulse is almost imperceptible. He died at seven o'clock in the evening.

Autopsy, thirty-six hours after death. Cadaveric stiffness was very much developed in all parts not affected with tetanus, but the muscles of the neck, the shoulders, and generally all the parts where the tetanic stiffness had existed, excepting the jaws, are completely relaxed. The different degrees of the burn recognized during life, are again perceived.

The skin of the thigh presented an eschar a square foot in size, which was detached, and in its place was a broad wound of a healthy aspect.

Apparatus of sensation. The veins within the skull are very much engorged with black blood. The arachnoid membrane has a slight opaline tint: it is detached with difficulty from the gray substance of the cerebrum: blood seemed to have flowed to this part in abundance, which communicated to it a uniform rosy color. If we press it, a great number of drops of blood appear on its surface, although this does not diminish the redness. Below the gray substance, the white substance is very much spotted with blood: but at one inch from the gray substance, this color diminishes to such an extent that the injection of the vessels almost disappears, near the ventricles. There is a layer as broad as the palm of the hand on each side and on the surface of the cerebral hemispheres. The ventricles contain a very minute quantity of serum. Injected vessels of large size, extended on the surface of the corpora striata and thalami optici: the interior of these parts, as well as of the annular protuberance, were but slightly injected. Farther, the encephalon had considerable consistence. When the spine was opened, the veins also were gorged with black blood. The spinal marrow was carefully examined in every part and seemed of the usual consistence. The gray substance in its centre was rosy and very much injected, especially a little below the cervical prominence, and some inches lower, on a level with the eighth and ninth dorsal vertebræ: so that the gray substance of the brain and spinal marrow was injected and uniformly red.

Digestive system. There was a little redness near the great curve of the stomach, for about two square inches, but this redness was slight and gradually diminished. The ileum was generally reddish: and a blush of red was seen here and there in the ascending colon; the liver and the spleen were healthy. *Respiratory system.* The bronchi were healthy; the two lungs adhered posteriorly by some old cellular filaments, and were slightly engorged along their posterior edge. *Circulatory system.* The heart and the vascular system are healthy: the large veins contain much blood. *Genito urinary system.* This presents nothing remarkable.

Case 6. *Burns from the first to the third degree. Diffuse inflammation supervening at the period of reaction, and followed with symptoms of gastro-enteritis, and with meningitis. Death.* Magin, sixty-three years old, a domestic, of a weak constitution, and in a bad state of health, while sitting near a fire, had a furnace at her side, in which was a great quantity of charcoal. The vapor of the charcoal stifled her, she fell into the fire, her garments inflamed, and caused a severe burn in the right heel and the thighs. Her neighbors ran to her assistance. She was carried immediately to Hotel Dieu, and no symptoms of asphyxia remained: but she suffered very much in the part which was burned: on each thigh was a broad eschar, which was white, hard and sonorous, and was surrounded with numerous phlyctenæ: (third and fourth degrees.) A vivid erysipelatous redness appeared on the thighs, and on the posterior parts of the trunk: (first degree.) Another burn was seen on the lower part of the right limb: above the heel was an eschar the size of a dollar: on the posterior face of the leg was an erythematous redness: in other places were phlyctenæ filled with serum: (the third, first and second degrees.) A bath, and dressing with fine linen spread with cerate, and an opiate were prescribed.

In the night the patient was restless, and distressed with bad dreams: the next day she complained of a violent head-ache:

(venesection). The third day severe pains were felt near the eschars. The patient being in the habit of lying on her back, as is generally the case with old people, she was directed to keep herself on her belly, on account of the burn. This precaution is very important: for the weight of the body may increase the extent of the eschars, and in some patients will cause gangrene. The fifth day, the eschars began to be detached at their circumference, and did not seem very deep. The patient demanded food with eagerness, which was refused. In the evening she felt chills, fever, and pains in the whole lower extremity. The burn in the first and second degrees had disappeared: but consecutive inflammation appeared, and an erysipelatous redness extended over the limb, attended with engorgement.

The sixth day, this inflammation had assumed all the characters of a diffuse phlegmon, and extended to the upper part of the thigh; the knee joint was very painful. Fearing that general bleeding would weaken the constitution of a patient who was so enfeebled, too much, twenty leeches were applied to different parts of the limb. The progress of the burn was satisfactory: the eschars were nearly detached: the suppuration was slight.

The phlegmon appeared stationary for thirty-six hours; but delirium soon supervened, the features were contracted, the tongue and the lips were dry: the fever reappeared with greater intensity, the patient was affected with vomiting and diarrhea, and she died the eleventh day after the accident.

Autopsy, thirty-six hours after death. The examination of the external surfaces prove the injuries which we have described. *Skull*. The brain was consistent and unaltered. The ventricles contained a great quantity of reddish serum. The meninges, and particularly the arachnoid membrane, were inflamed. *Thorax*. The base of the right lung was hepatized: the bronchi were deeply injected, and filled with thick mucus. The pleura of the right side presented a slight effusion: the

heart was large: the cavities were dilated, and its parietes were thin. The pericardium presented on its inner surface some white layers, which indicate old inflammations. *Abdomen.* The mucous membrane of the stomach was very red, the gall-bladder contained about thirty small calculi. The mesentery was filled with inert tubercles. The liver was very large and flat.

Case 7. *Asphyxia by charcoal. Burns from the second to the fourth degree by the clothes taking fire. Deviation of the menses through the wound. Symptoms at the period of suppuration and exhaustion. Death in eight months.* Although the details we possess in regard to this case are few, we nevertheless must give a brief history of it, because it presents an instance of another kind of termination of burns, which is not rare; one of those cases where the patients die after a longer or shorter period, because they have not sufficient strength to support the process of cicatrization, after having experienced different consecutive symptoms.

Mary Tonchu, forty-two years old, while melting some ice over ignited charcoal, fell in a state of asphyxia. The fire communicated to her garments, and broad phlyctenæ were formed on the lower part of the back: the skin of the haunch was scorched and hardened. In four or five days, large eschars covered the whole burned surface: eight days after, the menses supervened. At the same time blood appeared in clots on the ulcerated surface. (We shall mention another case of this deviation of the menses.) Pains were extremely severe, suppuration soon became very abundant, the pulse was feeble and small, and the patient failed. Tonics were prescribed. She was admirably patient and docile, and remained constantly on her belly. It was difficult to check the abundant suppuration: cicatrization remained stationary, or made but slow progress. Numerous symptoms succeeded, such as erysipelatous affections, abscesses near the joints, symptoms of gastric irritation, &c. The patient fell into a state of maras-

mus and complete exhaustion, and she died *eight months and thirteen days* after the accident, when the cicatrization was nearly or not entirely finished. This case, as we have already remarked, presents one of the most advanced periods when death can happen.

Case 8. *Burns of the feet from the first to the fourth degree, by a foot bath ; diffused phlegmon. Death the seventh day.* A young lace-maker, about seventeen years of age, of good health and constitution, hearing that her engagement with a young man to whom she was much attached, was broken off, resolved to destroy herself: she therefore shut herself up in a close chamber, filled two furnaces with burning charcoal, and soon fell in a state of asphyxia: the length of time she remained in this state before assistance was given her, was unknown. A female, who came to see her, hearing some heavy groans, burst open the door, and she was found apparently lifeless: she was carried to Hotel Dieu, after ineffectual exertions to restore her to life.

The whole surface of the body was of a violet color, the respiration was imperceptible, and the pulse could not be felt at the wrist; but there was a slight pulsation in the temporal arteries. The patient was placed near an open window; her body was rubbed with hot vinegar, and she manifested signs of life. A vein in the arm was then opened, but only a few drops of blood escaped: the fluid, however, soon jetted out, and three cups were taken from her. A foot bath, with mustard, was prescribed: instead of giving it at the usual temperature, say 30° R., the servant placed her feet in boiling water: in about an hour, the patient spoke, asked several questions, and complained of the heat of the water, and of the numbness in her feet: she was put to bed.

The next day she seemed very much distressed, and complained of violent pains in the legs: they were examined, and it was found that a severe burn of the feet existed, which extended three fingers' breadth above the malleoli: the toes had

lost the epidermis : yellow and hard eschars covered the back of these parts and the tibio-tarsal articulation : the limit of the burn at the lower part of the leg was marked by numerous phlyctenæ : above, there was a bright redness on each leg, attended with a slight tumefaction and severe pains. The third day after the burn, all traces of asphyxia had disappeared, but the vital powers were extremely affected : the pulse was very small and feeble, the eyes were glazed, the cheeks red, and the patient sunken. The parts were dressed with linen spread with cerate, with cataplasms, and placed on pillows. The fifth day, the inflammation had progressed very far, (thirty leeches were applied to each leg, and a bath was ordered.) The sixth day, an obscure fluctuation existed in the right limb : the phlegmon had extended to the knee and thigh. The countenance was changed, the mind deranged, delirium supervened soon after, and the young female died the seventh day.

Autopsy. The different degrees of the burn were remarked : some deep eschars had begun to be detached at their circumference. All the articulations, and particularly that of the foot with the leg, were inflamed ; the synovial membrane was red and injected : in the right tibio-tarsal articulation was a marked effusion of bloody serum. Above the burns, the skin had peeled off to a considerable extent, and on the right, two deep purulent abscesses existed, the pus from which had burrowed between the muscles to near the thigh. Pus also had infiltrated into the cellular tissue of the thigh, and the lower posterior part of the trunk. The cellular tissue was dense in every part.

The great cavities presented nothing remarkable, except a marked injection of the meninges of the cerebral substance.

All the preceding cases have been selected from a great number, which have constantly presented themselves in M. Dupuytren's ward. We have designedly chosen unsuccessful cases, in order to show by what causes death is produced, at

different periods of a burn, and also the anatomical characters presented on a post mortem examination. After mentioning the professor's mode of treatment, we shall state others, to show the triumphs of medicine over this severe malady, and its complications.

Let us review the most striking and instructive points of these eight cases. In all these patients, the burns were severe, deep, and more or less extensive. In the first two, they covered nearly the whole body, and penetrated to the derma. These two patients, (second and third cases,) died from excessive general irritation, one aged three and a half years, in a few hours; the other, aged about thirty years, the second day. A third patient, (case fourth,) could not resist the inflammatory reaction, and died the fourth day from the beginning of the period of elimination, with violent symptoms of inflammation of the brain and of the digestive organs. The fourth patient was affected at the commencement of the same period of elimination with a formidable tetanus, which destroyed him the twelfth day. Autopsy showed severe lesions in the whole nervous system, in the brain, and spinal marrow. In the sixth and eighth cases, diffuse consecutive phlegmons were developed at the period of elimination, produced extensive abscesses, and the peeling off of the skin to a great extent, inflammation and suppuration of the joints, and after reacting sympathetically on the internal organs, caused death; in the first about the eleventh day, and in the second about the sixteenth. Finally, in case seventh, the female experienced a variety of symptoms for eight months: suppuration continued, the cicatrization was not completed, and the patient died from marasmus and complete exhaustion.

After stating these facts in support of his remarks, M. Dupuytren proceeded to explain the treatment of burns. Burns, said the professor, have been in every age the object of the most trivial attempts at empiricism. In every century, some sovereign remedies have appeared, which, after being more

or less praised, have been replaced by others, and these, in their turn, have been forgotten. It has been, and is still, impossible to undeceive those who look for infallible remedies against burns. As stubborn as those who seek the quadrature of the circle, they still continue to search for this panacea. One remarkable thing which may impose on the multitude, is the absolute and perfect confidence of all possessors of secrets of this kind.

Case 9. A young female, continued M. Dupuytren, was brought to Hotel Dieu a few years since. The combustion of her garments had produced a frightful burn, which extended nearly from the feet to the head.

From the absolute insensibility of the burned parts, from the destruction of the epidermis, from the disorganization of the rete mucosum, from the tension and the yellow bistre color of the chorion, it was easy to see that the whole of the skin was affected. From the weakness of her voice and pulse, her immobility, her coldness, and sleepiness, we judged that this unhappy person was struck with death; that if she escaped the dangers of this state of debility, she probably could not resist the consequences of the eliminatory inflammation, and that in any case her strength would not be sufficient for the abundant suppuration which must ensue, and still less for the cicatrization.

A lady, whose manners and appearance were respectable, had attended this patient to the hospital, and earnestly requested to be allowed to treat her in our presence. She had, she said, inherited a secret, transmitted from generation to generation for four hundred years, by which thousands had been cured. I stated to her, continued M. Dupuytren, that the patient in whom she took so lively an interest was affected with an incurable and mortal burn; but it was in vain that I requested her to wait for a more favorable opportunity, were it only for the sake of the remedy. She insisted so much, that after assuring us that it contained nothing injurious, we per-

mitted her to use it. Nothing could equal the care and devotion with which she applied her ointment several times a day to the patient.

A lively reaction, caused by the inflammation, soon appeared : she rejoiced at it, as a salutary effect of her remedy. Circles of the inflammation were seen around the burn, and she asserted that the disease would now be conquered ; large portions of the tissues were detached every day, but she was not undeceived. Finally, death alone, which took place the fifteenth day after the accident, seemed to raise in her mind some doubt as to the power of her hereditary secret.

On what then depends, said the professor, this unlimited confidence on one side, and on the other this blind credulity of the people, which is shared however by many intelligent persons ? On the circumstance that a burn is considered as a disease simple in its nature and phenomena, constant in its progress and effects, and which is therefore easily cured by a remedy as simple and invariable as is the disease.

This is the base of all the hopes and all the promises of the inventors of secret remedies. To destroy an error so prejudicial, is to render a service to humanity. We will say, then, so far from being a simple disease, burns, on the contrary, are very complex ; and their numerous and varied degrees constitute affections which present distinct characters, various consequences, peculiar complications, and which consequently require very different modes of treatment.

To be convinced of these facts, it will be sufficient, said M. Dupuytren, to recall to your memory the numerous effects of heat on living tissues, which we have described. If we compare the material and immediate effects of the action of caloric with its consecutive effects ; with the eliminatory, suppurative, and ulcerative inflammation ; with the local and general fever ; with the numberless complications which accompany it, pains, spasms, convulsions, &c. ; with the care required in cicatrization, which must be retarded in some cases

to avoid deformities, and quickened in others to avoid death; we shall be able to judge of the folly of all secret and infallible remedies. We shall see that a profound knowledge, a correct acquaintance with the system and the alterations which may occur in it, and finally, a perfect understanding of the modes of restoring it to its primitive state, can alone enable us to treat them with success.

The treatment of these lesions, resumed the professor, rests on the following indications: 1st. To remove the cause of the burn. 2d. To moderate and subdue the inflammation in the first two degrees, the pains and the irritation of the skin, which are developed at the time of the accident, and to prevent their effects on the internal organs. 3d. To keep within proper bounds the secondary inflammation, which exists when the eschars are separated, and suppuration is established. 4th. To favor and direct the cicatrization of the wounds which continue when the eschars are thrown off. 5th. To oppose, consequently, the formation of bridges, or of bad adhesions, which may hinder more or less the motions of the parts, or even deprive them of their functions. 6th. Finally, to meet with proper treatment, the primitive or consecutive general symptoms which may appear during the disease.

The first indication seldom presents itself to the surgeon, except in burns produced by the action of caustics, in which cases a portion of the caustic not yet combined may adhere to the surface of the parts. This is done by lotions, which will neutralize the burning substance, and which are learned from chemistry. In most cases this mode can be supplied by lotions of pure water.

In burns of the first or second degree, where the epidermis is not denuded, all the practitioner's efforts must tend to neutralize the inflammation, and prevent the formation of phlyctenæ or eschars, which, if they existed, would render the treatment longer and more difficult. The best mode of fulfilling this indication is to employ remedies possessing slightly

astringent, sedative, and not stimulant properties. The immersion and bathing of the burned part in cold water, in Goulard's extract, in spirituous or slightly acidulated water; and when this immersion is not possible, long continued and frequent fomentations with the same liquids, or with alcohol, a solution of sulphate of iron, sulphate of alumina, and of potash, or ammonia, &c., produce very good effects. But these last substances cannot be employed, except when the epidermis has not been removed: in the contrary case, they will increase, instead of subduing the irritation, and will cause severe pains. It is then very important to preserve the epidermis of the burned parts entire, and the patient's clothes therefore should be removed slowly and carefully, and should even be cut off, if necessary. If phlyctenæ exist, they should simply be pricked with a needle or the point of a lancet, at their lowest part. If the irritation and the pains are very great, and bad symptoms present themselves, opiate potions and topical anodynes, may be used advantageously. If the subject be young, vigorous, and sanguineous, general or local bleeding, will contribute powerfully to produce a calm, and to prevent the development of inflammation. Farther, all these remedies will be more efficacious, the sooner they are employed after the accident. In all these cases, the patients should be confined to diet, which must be more strict, the more serious the injury is; and they should use mucilaginous, acidulated, and diluent drinks.

Finally, if notwithstanding all our exertions, inflammation appears, it must be moderated, and prevented from attacking the healthy tissues, and from becoming excessive, from terminating in gangrene, or from reacting too powerfully on the internal organs, and from giving rise to the formidable sympathetic symptoms which we have described. We must then have recourse to emollient fomentations, and cataplasms of the same kind, to general and local bleedings. If the pains be very intense, we should combine with the preceding, topical appli-

cations, as the tranquillizing balsam, (made by macerating and boiling in sweet oil, narcotic plants, such as belladonna, stramonium, &c.) the laudanum of Rousseau, decoctions of hyosciamus, of belladonna, poppy-heads, &c.

The same indication presents itself also in burns of the third and fourth degrees, when the inflammatory process of elimination begins to take place. We must repress the inflammation if it be violent, and stimulate it if too slow. But we must remember that in this case, stimulants, if too powerful or too long continued, have often caused erysipelas, which arising at the edges of the wound, has attacked successively a large portion of the body, and has often proved fatal. We have generally arrested its progress, said M. Dupuytren, by applying a transient blister over the part affected.

Other cares however, are now required at this period. The burn should be covered with fine linen, perforated, and spread with a fatty body, as simple cerate, or Goulard's cerate, (made of wax and a solution of acetate of lead) over which should be placed a thin layer of coarse lint to absorb the pus. Emollient cataplasms should be applied to the eschars to hasten their separation. When they are entirely detached, and are held to the base of the wound by only a few filaments, they should be cut off with scissors as near the wound as possible. Sometimes, when the eschar is very deep, as in burns of the fourth and fifth degrees, pus collects near them, as is evidenced by the fluctuation; it should be immediately discharged, by making incisions, in order that it may not infiltrate into the adjacent tissues. After very superficial eschars have fallen off, or the epidermis which formed the phlyctenæ is separated, if the derma be very painful, the opiated cerate, and compresses soaked in a weak solution of opium, are the best topical applications.

The burns should be dressed quickly, so as to be exposed to the air as little as possible, and with prudence and lightness, in order to avoid giving the patients pain, which is not always

free from danger. Hence a small part of the wound should be dressed, before the remainder is exposed. For this purpose, Scultet's bandage, with separate tails, is much preferable to the roller bandage.

After extensive burns, and especially burns in the fourth and fifth degrees, the suppuration is generally so abundant that two or three dressings per day are required, and the patients rapidly lose their strength. In this case, we must support the strength by some substantial food, and especially by tonics, as quinine administered internally, by enemata, and as a topical application. In burns where the tissues are more or less destroyed, the cicatrices are often mis-shaped, and sometimes hinder the free motions of the affected parts, or prevent the exercise of a function. It is important, then, to guard against these deformities which are sometimes repelling, and these inconveniences, by taking care that the cicatrix has nearly the same extent as the skin which is destroyed, and by preventing its formation by the approximation of the adjacent edges. This end is generally attained by applying caustic to the granulations which are too prominent, by the position of the limb, by proper bandages, and by using firm dressings. Thus the patient must keep the limb extended, if burned in the direction of flexion, or flexed if the burn occur in the direction of extension; tents, wicks, canulas, or sponges should be introduced into the natural passages, which the cicatrix tends to contract or close. We must separate by compresses and pledgets, kept in place by bands of sere cloth, those organs, as the fingers, which are disposed to form bad adhesions. In the face, where the tissues are so movable and extensible, art cannot always prevent the formation of greater or less deformities. These should be opposed as much as possible, by separating the edges of the wound by adhesive plaister, and by other modes which the nature of things may suggest. But, in all cases, if we cannot obtain a healthy cicatrix except by

causing the patient pains which may be fatal, it must be renounced.

When a limb, or a part of a limb, is completely destroyed, amputation is indispensable. It substitutes a simple wound, the suppuration of which will be prompt, and the cicatrization regular and easy, for an eschar which will not be thrown off for a long time, and which will leave behind it an irregular wound, with a projection of the bones and all the parts which are situated more deeply; and have suffered less from the action of the fire. Farther, by removing the burned parts, the operation preserves the patient from the secondary inflammation, which must necessarily appear, and which is then somewhat dangerous. Before deciding upon this, however, the surgeon should carefully consider the age, constitution, and strength of the patient, and see if he be in a state to support the process of elimination. It is well understood, that if the patient falls into a state of stupor, as is observed in many cases, or if local inflammation appear, with fever, &c., we must wait until these symptoms disappear, and suppuration is established, and then consider, before acting, the general state of the patient, and that of the wound.

When the cicatrices are formed, the tissues are stiff, and the parts cannot perform their functions freely; the patient must then use fomentations, frictions, oily embrocations, and douches. On the other hand, the exercise at first should be very moderate, in order that the cicatrices may not break, which often happens, particularly when they are situated on the lower extremities.

We have now, said M. Dupuytren, to say a few words on the general treatment required by patients, according to the severity and the different periods of the disease. A slight and superficial burn, which causes no constitutional derangement, demands no internal remedies. But if although superficial, it be very extensive, the patient should be confined to a strict diet, to demulcent and cool drinks, and placed in a quiet and

airy chamber, and be kept free from physical or moral excitement. The same mode should be employed in deep burns. The severe pains should be treated with large doses of opium; the fever and inflammatory symptoms, with blood-letting, especially if the patient be strong and plethoric; but we must insist less on bleeding, when large and deep eschars intimate that the suppuration will be excessive; for the patient, if weakened by this cause, may be unable to resist the suppuration, and may die from exhaustion. Drinks, diet, and rest, are the only remedies in this case.

When the suppuration is established, and the fever has disappeared, light food and nutritious drinks should be given in small quantities. If the discharge of pus be very abundant, and continue a long time, and the patient be in danger from exhaustion and marasmus, preparations of iron and quinine should be used. If symptoms of marasmus and diarrhea appear, the patient must take, three or four times a day, a pill, composed of opium one half a grain, and sulphate of zinc one grain, which we have found very useful. Finally, inflammations of the viscera may appear, and should be met with appropriate remedies.

Case 10. *Epilepsy; burns in the third and fourth degrees of the posterior part of the right lower extremity. Perfect cure the one hundred and forty-fifth day. No attack of epilepsy during the treatment.* Lampet, thirty-six years old, epileptic from infancy, was sitting in her chamber, with a furnace filled with burning charcoal. She became senseless, and fell upon the furnace, so that the posterior part of the right lower extremity was exposed to the blaze for some time: it caused a burn in the third and fourth degrees, which extended from the upper third of the thigh, to below the middle of the leg, and embraced more than half the circumference of the limb, especially near the ham; the skin, the subjacent cellular tissue, and the surface of the muscles, were consequently destroyed.

The first treatment she received in the city consisted in the application of compresses spread with cerate, and in anti-spasmodic drinks. The patient remained at home the first seven days. Inflammation had commenced, the line of demarcation between the dead and living parts was established, and the extensive eschars seemed attached to the limb only by a few points, when she entered Hotel Dieu, April twenty-ninth.

Perforated compresses spread with cerate, lint, emollient cataplasms, and calming drinks, formed the treatment. In three days, the eliminatory process was completed, the eschars had fallen off, and the surface of the wound appeared of a red color, and presented healthy granulations. The same dressing was continued ; but in order to prevent the formation of bridges, which might obstruct the motions of the limb, and render it deformed, this was placed as in a transverse fracture of the patella, on a plane inclined from the heel to the tuberosity of the ischium.

The suppuration being very abundant, the wound was dressed and carefully cleansed twice a day. This suppuration having progressively diminished, the cicatrization proceeded rapidly from the circumference to the centre, and in a short time the size of the wound had diminished.

The progress of the patient, however, was soon arrested, as is frequently the case, by an excessive development of granulations. Although the nitrate of silver was applied, they appeared each day with new vigor, and notwithstanding all the efforts of the surgeon, a complete cicatrix was not formed for one hundred and forty-five days.

The limb retained its natural shape, and consequently recovered the free use of all its motions. The patient left the hospital September eighth. During her stay there, she had no attack of epilepsy. Could she have been cured of this disease by the accident ? We regret that we have not seen her since, and are unable to answer this question.

Case 11. *Epilepsy. Burns in the first four degrees*

of the right side of the face and neck, and of the upper part of the chest. Severe symptoms. Abundant suppuration. Cure the ninety-fourth day. Twelve attacks of epilepsy during the treatment. Mary Floret, forty-six years old, of a delicate constitution, affected with epilepsy for many years, having already been burned five times in consequence of this affection, entered at Hotel Dieu the second of May. The right side of the neck, and the upper and anterior third of the chest was burned. In an attack of epilepsy, she had fallen into the fire, and remained some time in contact with the furnace. There resulted burns in the first four degrees, in the regions above mentioned. The eschars were broad, deep, and blackish, hard to the touch. The burns in the first two degrees were very slight. The patient was in a state of great general excitement: she was delirious: the pulse was extremely small and corded, and very quick; the respiration short and interrupted; the mouth dry, thirst urgent, and the extremities very much convulsed.

Venesection was practised, and leeches were applied to the base of the skull; revulsives and anti-spasmodics were used; sinapisms were applied to the feet; and enemata, with ten drops of laudanum, were administered. The eschars were covered with broad emollient cataplasms, in order to facilitate their detachment; and the burns in the second degree were dressed with fine linen, spread with cerate, and perforated, over which was spread a thin layer of lint, in order to absorb the pus. The patient soon became convalescent. The eliminatory process then commenced, and in a short time all the dead parts were separated. No bad symptom occurred during this period.

After the eschars were thrown off, a broad and healthy wound appeared. Suppuration was very abundant, and the wound was dressed twice a day; after a little time, however, the discharge of pus diminished, and cicatrization commenced. A great number of granulations arose above the surface of the

wound, to which caustic was applied. The cicatrix extended each day ; the suppuration was less abundant ; the cataplasms were removed, and the wound was dressed simply with perforated linen spread with cerate, over which, lint, some compresses, and a proper bandage, were applied. The ninety-fourth day, the cure was complete. She had twelve attacks of epilepsy during the treatment.

Case 12. *Mental derangement. Voluntary burn of the right hand in the fifth degree. Cure of the two diseases.* Clinard, thirty-six years old, a domestic, of a good constitution, was affected with mental derangement, in consequence of extreme disappointment. An active treatment restored her reason, but she still continued sad and downcast. She left her village, and came to Paris. Her mistress soon perceived her disposition ; she threatened to turn her away. Being alone on the evening of the seventh of November, she made a very large fire in the kitchen-stove, and placed her hand upon the burning coals. Some one accidentally came to her ; she appeared very much agitated, but did not change her position. These circumstances, and the smell of the burned flesh, which filled the kitchen, discovered the madness of this unfortunate being. It was not without trouble that she was led away from the fire to her bed. She uttered loud cries through the night, and requested that she might be destroyed. The next day she was carried to Hotel Dieu.

The right hand seemed burned to the bone ; it presented in every part, black, hard, and thick eschars, separated from each other by some cracks, from which no blood issued ; on the back of the hand they extended only to about the centre of the metacarpus : the rest of the hand was covered with a large phlyctena, filled with serum. A bright red circle surrounded the wrist. The radio-carpal articulation preserved its motions ; the fingers and the thumb were flexed on the hand ; two of their articulations, those of the ring and the little finger, were open. The patient was extremely agitated ; the face

was very red, the eyes fixed, and the delirium constant : she was confined in a straight jacket : (general bleeding, mustard pediluvia, and dressings of perforated linen spread with cerate, were prescribed ; the hand was covered with a large cataplasm, and the phlyctenæ were opened without tearing the epidermis.) The third day after the accident, the patient was in the same state. (Fifteen leeches were applied to each mastoid process ; pediluvia and enemata were prescribed.) The fourth day, there was no improvement : (a seton was placed in the neck, and a purgative enema, were prescribed.) The seventh day, the eliminatory process had advanced ; the eschars in the palm of the hand, and on the dorsal face of the fingers, began to be detached ; we hoped that the tendons were not destroyed : the small quantity of pus which escaped was fetid ; (the cataplasms were continued, and two hand baths per day were prescribed.)

The eighteenth day, the patient's cries and exclamations had ceased ; she sang in a low voice, spoke softly, and if her attention was strongly excited she answered.

The thirty-eighth day the mental derangement had entirely subsided ; for forty-eight hours the patient was grieved at what had happened to her ; but she remembered nothing, and was very much astonished on learning all the circumstances of her disease. The extent of the burn was finally determined. The last phalanges of the ring and little fingers, and also the eschars had fallen off. Cicatrization commenced in some parts ; very small portions of the dead tendons were removed with the dressings ; there was a trifling flexion of the fingers. They were placed upon a splint, in order that they might be extended and be dressed with care, so as to avoid all unnatural adhesions.

From this time, no bad symptoms supervened ; cicatrization took place slowly, and the wounds were frequently cauterized with the nitrate of silver. The cure was complete the twentieth of February, one hundred and three days after the accident. No symptom of mental derangement returned, and the

fifth of March the patient left the hospital perfectly well : she was recommended to continue the seton in her neck.

Case 13. *Burns from the first to the sixth degree, on the left side of the face : in the fifth degree, on the outer side of the left shoulder. Destruction of a portion of the parotid gland. Salivary fistula. Necrosis of a portion of the malar bone, and of the zygomatic arch. Cure.* A portress, forty years old, whose menstruation was deranged, and who was subject to dizziness, was sitting on the evening of the 4th of April, near a stove, which was heated with charcoal. She was unable to tell what happened to her ; but probably being stifled, she fell upon the stove, against which the left shoulder and the face of the same side remained. After some time, she was found in this position, perfectly stupid, but was sensible the next day, when she was brought to Hotel Dieu.

There were two deep burns in the regions mentioned : the first extended upward, from the zygomatic arch to the base of the lower jaw ; embracing the outer angle of the eyelids, and crosswise from the commissure of the lips to the auditory passage. All the soft parts included in the space between these four points, were changed into a hard, black, sonorous echar, rough on its surface, which seemed formed at the expense of the skin, the subcutaneous cellular tissue, and a portion of the parotid gland, and to extend to the bone. A vivid redness circumscribed it. The commissure of the lips and eyelids were drawn backward and to the left. The second burn occupied the left deltoid region ; all its surface was scarified and black ; and M. Dupuytren thought that the disorganization extended to the muscle. The patient had fever ; the rest of the face was very red. There was headache, and severe pains were felt in those burned parts which were not entirely dead : (copious bleeding, pediluvia with mustard, enemata, opiates, and diet, were prescribed.) There was but a trifling change the first day : the pulse was still frequent : (venesection was

repeated.) The fifth day, the patient felt in the inner part of the cheek the sensation of a dry and hard body : perhaps the eschar had destroyed the entire thickness of the soft parts ; but on introducing the finger into the mouth, we felt that the mucous membrane was uninjured. The sixth day, the eliminatory process commenced : we remarked that a vivid red circle separated the living from the dead parts ; a slight supuration took place, and the circumference of the eschars was detached. The eighth day there was considerable fever, swelling of the eyelids, appearance of erysipelas in the face, delirium ; (twenty leeches were applied to the neck, and emollient cataplasms ordered.) The delirium subsided, the erysipelas was relieved. The twelfth day, the symptoms had nearly disappeared. The eschar of the cheek was already detached to a great extent.

That of the left shoulder came off about the first of May, that is, in about a month : a broad surface, covered with healthy granulations then appeared ; a simple dressing and a few cauterizations, entirely cured this burn, about the commencement of July.

But the cheek did not progress so rapidly ; the eschar was not completely detached till the sixteenth of May. A portion of the malar bone and the zygomatic arch were then exposed, which were dead, and also the parotid gland, a portion of which had been destroyed : during the dressing, an inodorous, transparent, and thin fluid escaped from the wound, the quantity of which was increased by mastication : it was saliva : the parts of the dressing were filled with it. This fact did not seem to M. Dupuytren to aggravate the situation of the patient, and he stated that the fistula would be cured by cauterization. The twentieth of May, the decayed bones seemed movable enough to be extracted. A spatula, in the form of a lever, served to detach a portion of the malar bone and the zygomatic arch, which were still articulated together. A little blood escaped during the operation.

From this day, the size of the wound progressively diminished, the discharge of saliva continued. It occurred from the ulcerated parotid gland, and not from the canal of Stenon. The first cauterization was performed the twenty-third of May, with the acid nitrate of mercury.

The twenty-eighth, the patient perceived that the discharge of the saliva was less. Cauterization was performed twice again on the second and fifth of June. The discharge had diminished still more. M. Dupuytren then employed compression on the point of the gland from which the fluid was discharged: the wound was now as broad as a five-franc piece.

The ninth of June, the saliva was discharged only in drops: finally, the twenty-ninth of July, the burn and the fistula were entirely cured. The patient, however, had a large radiated cicatrix with depression, a paralysis of a part of the cheek, while the commissure of the lips and of the outer angle of the eyelids were drawn backward. The cicatrix was thin, red, and seemed entirely vascular. The patient left the hospital, July thirtieth. But a month after, the cicatrix was broken at the point corresponding to the old fistula: the saliva again escaped from it. She returned to the hospital, submitted to the same treatment, to the cauterization and compression, and she left it again in about three weeks, perfectly cured.

Case 14. *Burn in the fourth degree, of the right upper extremity. Abundant suppuration. Deviation of the menses through the wound. Cure.* A cook, eighteen years of age, enjoyed good health and proper menstruation: the 23d of August she went to sleep with a candle burning near her; the candle fell upon her right arm and set fire to the edge of her robe. She was awakened by the pain, cried out and threw off her dress and lost her consciousness. She was carried to her bed; her senses returned, and she experienced severe pains. A surgeon was called, and he found a severe burn of the right upper extremity, extending from the deltoid

muscle to the fingers: the deepest eschars appeared on the fore-arm, and the lower and posterior part of the arm: the hand presented some phlyctenæ filled with serum; there were also some on the left arm. She was bled in the arm. The patient was put upon the use of emollients, and the burns were dressed very carefully with fine perforated linen, spread with cerate. The period of irritation and the commencement of the eliminatory process, passed without any serious symptoms. But after the eschars were detached, the suppuration became so abundant, that we feared the patient would die from debility. The strength was supported by quinine taken internally and in enemata. The whole limb, except the hand, which was soon cured, presented only a bright red wound. The attention of the physician in respect to the dressings and the internal remedies was redoubled: the patient seemed very courageous and docile, her general state improved: but the cicatrization was extremely slow, and she came to Hotel Dieu the 11th of October, forty-five days after the accident.

The wound was still large, very much inflamed in nearly all its extent, the suppuration was abundant, and numerous granulations arose above the skin; in and near the bend of the elbow was a newly formed cutaneous tissue. M. Dupuytren prescribed baths, applications of broad and thick emollient cataplasms, and rest. The menses had not appeared since the accident. The inflammation was soon discussed. The wound was then dressed with a perforated linen, spread with a thick layer of fresh cerate; over this were placed pledgets of lint, and long compresses which could be changed easily: every day, also, the wound was touched with nitrate of silver, which was applied over a small surface, in order not to cause inflammation again. Finally, every possible precaution was taken to exclude the air from the wound. One month after, there was great improvement, and a broad and healthy cicatrix had already formed on the posterior face of the limb.

The 16th of December, the patient had fever, the aspect of the wound changed, became red, and was covered with clots of blood, which had the color and odor of the menstrual discharge. This phenomenon appeared at the usual period of menstruation, which, as we have stated, had not reappeared since the commencement of the disease. A few leeches were applied for several days to the vulva. The fever soon disappeared, the wound ceased to discharge blood, and resumed its red color. But this new kind of irritation increased considerably the discharge of pus, which continued for nine or ten days. After that, the cicatrization resumed its course and continued to progress slowly: the 15th of April, the next year, a wound of about two square inches, still remained in the inner part of the fore-arm. This young female, however, continued in good health, with a fine appetite, and slept well. The blood was discharged twice again from the wound, the menses not being re-established, and they were replaced by emissions of blood.

The phenomenon of the discharge of the menses through a wound in the arm resulting from a burn, is too remarkable, said M. Dupuytren, to be passed over unnoticed. Menstruation is one of the most simple functions: it is merely an exhalation of blood. It does not, then, require a special organ for its performance: in the whole organism there are exhalents, or rather tissues, permeable to the blood, when the *molimen* supervenes. The case is different with the secretions: this function is performed by special organs, the structure of which is complicated; as the fluids they separate from the blood, vary in their characters from this fluid. Here there are mucous follicles, the organization of which consists in a simple vascular fasciculus and a peculiar tissue. We can discover no nerves in it. There we find crypts, of a more complex organization formed of a kind of erectile tissue, and of an expansion of a nervous filament: we already see there the rudiments of an excretory duct. Finally, these crypts agglomerate and

form glands which also differ from each other. But we will proceed no farther in these anatomical details. It follows from what has been stated, that the secretions are complex functions, and can be fulfilled only by a more or less complex special organization, and the exhalations, on the contrary, are very simple functions, which can occur in every part, because exhalent and permeable tissues exist in every part.

Nature may then permit, in regard to these latter, some aberrations which cannot occur with the secretions. See, also, how rarely they are displaced, and how difficult it is for the physician to restore them. The urine is sometimes discharged through the skin, but always imperfectly: one cannot urinate entirely through the skin. Menstruation, on the contrary, may occur entirely through the skin, and likewise through all the ligamentous surfaces. The interstices of the organs of females are often the seat of a *molimen*, and then, the blood being removed from the surfaces, and not being able to flow outward, combines with the tissues and produces more or less dangerous inflammations.

If menstruation can take place through all the tissues of the system when in the normal state, it seems that it can occur more easily through tissues more or less inflamed, and more favorable to solicit towards them the *molimen hemorrhagicum*. This, however, is not the case; the organic modification which constitutes inflammation is not at all peculiar to the exhalation of blood; it is not intended to replace a physiological exhalation, a natural function. This does not agree with the opinion of those who think that disease in general, is an exaggerated state of health, and inflammation, excitement carried to its highest state. Menstruation from the surface of a wound, is then a very remarkable phenomenon, since nature must be mistaken twice before it can take place.

We wished to conclude this article by a statistical table, established on a large scale, from which we might deduce some general propositions which would not have been uninteresting,

and state the frequency of burns in respect to the age and sex of the individuals, to the parts affected, their different degrees, the causes of death, and the results of the treatment. Obligated, however, to confine our remarks to one year, we have selected that of 1828, which presented a great many affections of this kind.

Number of patients with burns in 1828, 50 : males, 10 ; females 40. Ages—less than five years, 2 ; eight to ten, 1 ; ten to twenty, 8 ; twenty to thirty, 14 ; thirty to forty, 9 ; forty to fifty, 8 ; fifty to sixty, 6 ; over sixty, 2.

Situation.—In most cases, the burn affected different regions at the same time. In many patients, it covered nearly the whole surface of the body. In considering individually each burn in each region, the result is as follows :

Burns of the head, 8 ; neck, 4 ; right arm, 7 ; left arm, 16 ; thorax, 13 ; abdomen, 9 ; right leg, 33 ; left leg, 23.

Thus supposing the body divided into an upper and lower half ; the upper part including from the head to the epigastrium, the lower from the epigastrium to the feet, we have—Burns of the upper half, 48 ; of the lower, 65. But these results must vary from many causes.

Degrees of the burns.—In many patients, the six degrees have been seen distinctly ; in others, they have been blended ; in most cases they were united by two and two or three and three, which gives : Burns in the first degree, rubefaction, 37 ; second degree, vesication, 41 ; third degree, eschars of the rete mucosum, 20 ; fourth degree, eschars of the skin, 4 ; fifth degree, eschars of the bone, 2 ; sixth degree, destruction of a part, 1.

Results of the treatment.—These have been very fortunate. Individuals cured, 44 ; died, 6.

Causes of death.—Of the last three, two children, three years and six months old, died from *an excess of pain*, (period of irritation ;) two from diffused phlegmon and cerebral symptoms during the period of elimination ; one from excessive suppuration and symptoms of enteritis.

In another lecture, we shall treat of the cicatrization of burns, and the manner of preventing and of remedying the deformities they produce.

ARTICLE XVIII.

OF A PARTICULAR KIND OF ENCYSTED FIBRO-CELLULAR TUMORS, KNOWN AS NERVOUS GANGLIONS OR TUBERCLES.

THE scientific course of pathological anatomy, delivered at Hotel Dieu, by M. Dupuytren, has thrown a great deal of light on a number of lesions which have been hitherto disregarded, or imperfectly described as abnormal productions. Among the alterations which have been made the subject of the professor's lectures, we have selected this peculiar species of encysted fibro-cellular tumors, on which authors have hitherto had very imperfect ideas, and which they have attributed very improperly to a disease of the nerves.

Every accidental membranous production, in the form of a closed sac, which is formed around a foreign body, or in any other manner, which is developed within those parts by a morbid action, is termed a *cyst*. This morbid tissue presents two great divisions : one comprehends all the cysts which are organized around a solid or liquid foreign body ; the other includes all those which form spontaneously, and which exist before the matter they contain.

Effused blood, particles of lead, bullets, urinary calculi, fetuses developed in the tubes and ovaries, and hydatids, are

the foreign bodies around which the cysts generally form. In the second division, which includes the spontaneous cysts, existing before the material they contain, are included the serous, synovial, steatomatous, oily, mucous, and gelatiniform cysts, and a small hydatiform tumor, which is very well described by M. Dupuytren, and has hitherto been seen on the palmar face of the wrist, more rarely near the tibio-tarsal articulation, but always around the synovial capsules and their tendons.

Finally, in a third division are placed fibrous productions, which are characterized by a dense, whitish, and resisting tissue, which is but slightly extensible, and is generally arranged in lines; a great number of them have pouches, formed of fibrous or accidental fibro-cellular membranes. The tumors now to be described are most analogous to the latter class. From their nature, form, situation, and termination, they cannot be confounded with any of the preceding productions; for they are fibro-cellular, are nearly round, are never larger than a pea, are generally situated directly under the skin, in the limbs, and terminate in a cancerous hardness. It is difficult, at first view, to conceive that the small tumor seen in a limb, and which is hardly perceptible, should cause violent pains, and afterwards be the origin of one of the severest affections of the system, cancer. This, however, is proved by observation. Let us state M. Dupuytren's remarks on this interesting subject.

Many authors have described these tumors with sufficient exactness, but they believed them formed in the tissue or in the course of the nerves. Thus, Antoine Petit, in his dissertation on pain, after stating that the last terminating branches of the nerves are more sensible than the trunks, states, "the nervous ganglions are but little known: they appear in the form of small bodies as large as a bean, which are very hard, movable, and colorless, supervening from no apparent cause; they cause extreme pain on being touched, on violent motions, or in changes of weather: topical applications are ineffectual; extirpation alone can cure them. Dissection shows a white

tubercle, enveloped in a fibrous membrane, which generally adheres to the skin, is loose in the cellular tissue, or seems to be attached only to nervous filaments, of which it is the expansion. Most of those upon which I have operated were in the legs; one, however, existed in the arm." Cheselden, in his anatomy, after describing the structure of the skin, adds, I have seen twice, under the skin of the tibia, a small tumor, as large as a pea, extremely sensible, and hard; from the pains they caused, they were regarded as cancerous, and were extirpated. Camper, the first after Cheselden, has mentioned this disease in his work on pathological anatomy: "in the cutaneous nerves, small, hard tubercles are not unfrequent; these are real ganglions, although not larger than a pea: they cause constant lancinating pains; do not yield to external applications, and must be removed with the knife. I have often seen them in men: they are white and glistening internally, are as hard as cartilage, and are situated in the nervous tunic." M. Chaussier, in his synopsis of neuralgia, mentions them as follows: the nervous tubercles or ganglions are seldom larger than a bean, and are often smaller; they are oblong, flat, hard, cartilaginous, whitish, and sometimes brownish on their surface or internally. Enveloped in a fibrous membrane, movable in the cellular tissue, they seem attached only by nervous filaments: the pain which they cause constantly leaves this point, as a centre, extends some distance according to the distribution and connection of the affected nerve: extirpation is the only remedy for them. Finally, in a dissertation on the local affections of the nerves, sustained in 1822, at Paris, the author says of these *painful subcutaneous tubercles*: they are developed under the skin: they are usually surrounded by some cellular tissue, and seem attached to it only by nervous filaments: sometimes they are situated in the body of the nerve, or are between the filaments of the nerve, and envelope it.

We have now seen that the different authors whom we have

mentioned, speak of the nervous nature of these tumors, without supporting their opinion with any positive facts : some assert that they have seen one or two nervous filaments after they were extirpated, but they do not confirm this by dissections.

This rapid glance at the opinions of authors, demonstrates to you that the history of encysted tumors is far from complete. Numerous observations have proved that these tumors are entirely independent of the nerves. I have carefully dissected several, and when extirpating them in courageous individuals, have often removed a large quantity of cellular tissue, and have never seen the least nervous filament on their surface. Their tissue is evidently fibro-cellular, a little albuminous, and in time it becomes schirrous.

These tumors, continued M. Dupuytren, the seat of which is frequently in the subcutaneous or subaponeurotic cellular tissue, may also develop themselves in other parts. I have observed them in the mammæ. They appear as large as grains of wheat, coffee, or peas, and are sometimes oblong : they are also lenticular, flat, and are never larger than a small bean. Externally, they are smooth and opaque : they are hard. If you let them fall from a certain height on an uniform and resisting surface, they rebound like elastic bodies. They have a homogeneous tissue, and are pearly white, have neither cavities nor septa, are of a fibrous, fibro-cartilaginous, or cartilaginous consistence. If the nail be pressed into this body, a slight crackling is heard : it is covered by an opaque, dense, fibro-cellular envelope, a real cyst, which prevents its development, and probably causes the vivid pains felt by the patients. These tumors are never the seat of any inflammation, not even of redness. The cellular tissue which covers them is generally healthy, in most cases it does not adhere to them, and preserves its color ; but sometimes it is altered, and is violet, adheres firmly to their surface, and renders them immovable. We find in them no nervous filament : they are

independent of these organs. This opinion is supported by the following cases.

Case 1. A female came to the consultation, who had complained for several years of severe pains in the cheeks, which were sometimes considered rheumatic, and sometimes as proceeding from a neuralgia of the infra-orbital nerve: leeches, venesection, transient blisters, pills of Meglin, (composed of extract of black hellebore, valerian root and protoxide of zinc,) were employed, but unsuccessfully. A physician who was consulted, convinced that these pains depended on a nervous affection, divided the infra-orbital nerve. They became more violent: they were insupportable, and the patient came to see me. In feeling of the affected part, we perceived a small tumor which moved under the skin, which preserved its color: pressure upon it caused extreme pain. I removed it; the patient was relieved, and has felt no pain since. It is evident, that if the tumor had been formed from a nervous filament of this branch of the fifth pair, or rested upon it, the division of the nerve would have arrested the pain; but on the contrary, the pain continued, became more violent, and disappeared with the small tumor.

It is easy to see that the description given by authors of the first degree of cancer or schirrus, agrees with that of the tumors in question. M. Cruvelhier, in his *Anatomie Pathologique*, states that schirrus is formed of a fibrous and cellular tissue, filled with albumen. Finally, these tumors soften like schirrus, and like it, they are painful in many cases, and indolent in others.

Case 2. A female, about seventy years old, had a small flat tubercle, the size of a pea, situated superficially under the skin, a little above the inner face of the right knee: it was circumscribed and very moveable: the skin above it was unaltered. This female stated that the pains caused by this small body were excessive, and rendered life a burden: that she first perceived it about eighteen years ago, and that it had

hardly grown and had troubled her for only eighteen months : it was removed and the pains ceased, and never returned again. If this tumor had been formed in the course of or within the nerve, would it have continued insensible for more than seventeen years ? This case demonstrates the justice of our opinions on this subject. We shall, however, mention others which are no less conclusive.

Case 3. A female, fifty-nine years old, had a small tumor situated directly under the integuments on the anterior face of the fore-arm, in front of the radius, about three inches above the wrist. This tumor was somewhat movable, as large as a large pea, was extremely hard to the touch, and very sensible. The patient felt no pain from it, if it were not pressed ; but if touched, the pain extended from the affected part towards the body, and not towards the fingers. It increased very slowly for seven years, and one year remained inert. It was extirpated by a small incision made in its centre : it was evidently *encysted*.

Their slow and chronic progress, continued M. Dupuytren, is explained by their hardness and the nature of their envelope. Finally, their tendency to soften, after a greater or less length of time, is another proof of their schirrous character. If they are extirpated after they are changed, the disease reappears in the adjacent lymphatic ganglions. I have removed one, said he, at the upper part of the arm : it was softened : in a little time the axillary glands were affected, and the disease reappeared.

The age and sex seem to influence the development of these tumors : thus females are more subject to them than males ; and they are observed more particularly from the age of thirty-five to sixty years. Most patients attribute their appearance to blows on the part where the tumors appear. In some cases they seem to be produced by pricks.

Case 4. A shoemaker pricked his finger with an awl : shortly after the accident he felt a severe pain ; a small tumor

appeared at the injured part, and seven years after, he experienced paroxysms which were more and more acute. Caustic was applied, but in vain ; extirpation was completely successful, and the patient was entirely cured. The tumor was small, hard, cartilaginous, and encysted.

Sometimes these tumors arise from rheumatism, and disappear when the individual is cured of the principal disease.

Case 5. A medical student slept in an alcove, the wall of which was very damp. After staying some time in the hospital, he was affected with rheumatism in his great toe : soon after, there appeared below the skin which covered the internal saphena vein and the nerve, a hard tumor, the size of a grain of wheat, which when touched, caused a pain like an electric shock. This pupil changed his lodging place, and in a few days was cured of the tumor and neuralgia. The occasional causes of these tumors are generally very obscure, and in most cases their cause is unknown.

Fibrous encysted tumors are developed most frequently in the limbs, particularly the lower. They have been seen in the back, scrotum, face, and mammae. There are rarely more than one, and when several exist, they are perfectly distinct. The patients generally feel pain in the affected part long before any enlargement is perceptible. The least chafing of the dress, or the slightest pressure of the skin over them, causes lancinating pains. After a long time, generally, they are felt below the integuments, which they sometimes raise, and they are then easily perceived : they are most commonly movable, hard, and the least pressure causes pain : in most cases, the skin preserves its natural color : the pains generally recur at regular periods, and are severe and lancinating, like those of cancer ; those produced by pressure sometimes feel like an electric shock : they radiate from the tumor which is the point of departure, but they are then situated near a large nervous trunk, and act mechanically. Sometimes the pain is constant, and the patient is unable to sleep, and fails rapidly. If they

exist in the lower limbs, they hinder and even prevent walking. In some irritable subjects, the paroxysms cause real convulsions. I have been consulted, continued M. Dupuytren, by a young female who had for a long time a tumor, the size of a pea, at the upper and posterior part of the thigh: she suffered from it extremely, and the least pressure on it caused convulsions: it was removed, and the pains ceased instantly. In many cases these tumors remain indolent, even on pressure, for several years.

Pains caused by encysted fibro-cellular tumors, invisible from their smallness, have often been confounded with those of rheumatic affections or neuralgias. Convinced that the patients were affected with these diseases, they have been treated with transient blisters, leeches, and other remedies still more powerful. The two females, whose cases we shall mention hereafter, had borne the application of leeches and blisters along the limb, although the tumor was easily felt and seen. In neuralgias, the pains are acute, and extend the whole length of the affected nerve; they generally return periodically and regularly, every hour, every day, every week, and the pains are not increased by pressure. But those caused by an encysted fibro-cellular tumor, do not return at regular periods, but are sometimes continuous: they do not always extend in every direction, pressure renders them very severe, and is often necessary to demonstrate their existence to the patient: they are always troublesome every few hours.

The term ganglion, which has been applied to them, may cause them to be confounded with tumors of the same name, which are developed in the sheaths of the tendons, generally in the wrist: but the indolence of the latter, their situation, their mobility during the contraction of the muscles, their immobility under the skin, the existence of a cavity lined by a synovial membrane, and filled by a liquid similar to that which lubricates the articulations, are characters more than sufficient to enable one to avoid an error, which however might involve no bad consequences. Sometimes small lipomata have been

seen, which having become carcinomatous, cause extreme pain ; but their softness, and the septa they present, and which are filled with a yellowish, fatty matter, lardaceous in some parts, and fibrous in others, will undeceive, in this respect. Messrs. Sanson and Begin, in their last edition of Sabatier's Operative Medicine, mention a female affected with a lipoma of this kind, which caused such severe pains that her health was extremely affected.

Finally, it would be more easy to confound the encysted fibro-cellular tumors with tumors affecting the nervous tissue, which are termed *neuromata* : the latter, however, have a cavity filled by a more or less liquid substance, while the others have neither cavities nor septa : the neuromata sometimes become very large : the fibro-cellular encysted tumors are always small : the neuromata exist most frequently in the great trunks of the nerves ; the others are generally directly under the skin and far from the great nerves : of the first, there is commonly more than one ; the second are usually single.

If the tumor be movable, and the skin which covers it have its natural color ; if it be situated remote from important organs, as a large vessel or nerve ; if, in fact, it be directly under the skin, the prognosis is very favorable. If, on the contrary, it is motionless, and adheres to the skin which has become violet, and begins to soften, the prognosis is more fatal. If the tumor then be removed, the disease, as we have said before, reappears in the adjacent lymphatic ganglions, and the patients soon present all the symptoms of cancerous diathesis.

Caustics have sometimes been used to destroy these tumors ; but, said M. Dupuytren, they hasten their softening and do remove the disease completely. Some observations, which are in fact very rare, would seem to indicate the employment of narcotics on the tumor in those individuals who are afraid of the knife. A female, sixty years old, had a tubercle in the posterior and inner part of the knee. She never had concluded on an operation, although she experienced severe pains.

Narcotics were applied to the tumor a long time, and relieved the pain.

The surest, quickest, and least painful mode of cure, said M. Dupuytren, is by extirpation. When these tumors are very small, a slight longitudinal incision over them is sufficient: if they be as large as a large pea, a crucial incision will perhaps be necessary: in both cases, when the tumor is exposed, it should be seized with a double hook, drawn up and dissected with a bistoury from the tissue which unites it to the surrounding parts. The edges of the wound are then brought directly together by means of adhesive plaister. If the skin which covers the tumor be adherent and bluish, it must be removed with it: if the tumor be soft, the greatest caution must be used in touching it.

We will terminate this lecture by some cases illustrative of the professor's remarks.

Case 6. Mary Hareng, forty-five years old, a laborer, and married, entered Hotel Dieu, October thirteenth, 1828, to be relieved of constant pain, with very severe exacerbations, at irregular periods. This female was of a good constitution, and had passed the turn of life: she dated the commencement of her disease eighteen months back: obliged from her situation to be exposed to the damp cold, she attributed these pains to rheumatism. For this pretended rheumatism, she had employed all the local remedies generally used in this disease. The pains continued, and were increased by the least fatigue. They presented two principal characters: 1st. Their continuity: 2d. Paroxysms returning about four times in twenty-four hours, and continuing from a few minutes to an hour. These paroxysms might be caused by compression, or by a blow on the tumor, situated on the right inner and upper part of the thigh. These pains were lancinating, and extended from the upper part of the thigh to the knee. They were so severe that the patient could not speak; she was extremely agitated, and screamed from pain. When M. Dupuytren ex-

amined the patient, he saw that the pains were not rheumatic, but that they were caused by the development of a fibrous body under the skin. Pressure reproduced the paroxysms, while it had no effect on the adjacent parts. He decided to remove it, and the operation was performed October twentieth. A crucial incision was made, each branch of which was about one inch long : the skin and fatty cellular tissue were divided ; and the tubercle was seen in the fat ; it was white ; it was seized with a double hook, and removed with a probe-pointed bistoury. The pains immediately ceased, and the wound was united with adhesive plaister. When the tumor was examined, it appeared surrounded with a normal cellular tissue. It was as large as a small filbert ; its form was spheroidal ; its color was a pearly white : it was elastic, and bounded on the pavement : it was but slightly red, and presented no trace of vessels : internally, it had no cavity, nor effused matter : finally, it was formed of a fibrous envelope, and of a fibro-cellular tissue, in which fibrin predominated. The wound immediately cicatrized, and the patient was radically cured.

Case 7. An old soldier came lately to consult M. Dupuytren in regard to a small tumor on the outer and upper part of the right leg, opposite the articulation of the fibula with the tibia. This man was of a good constitution, accustomed to the privations and the fatigues of a military life, and seemed surprised at the severity of the disease. When questioned as to the origin of the tumor, he could not name the precise period of its appearance ; but he stated that some months previous, he had felt pains in this part, and perceived a small hard body, which when pressed upon was very painful : these pains gradually became so extreme as almost to destroy his reason. They reappeared several times a day, at more or less remote intervals, and radiated from the diseased part to the adjacent parts. This statement left no doubt as to the origin of the evil : it was a fibro-cellular tumor, of the species we are now treating. Its situation, size, the pains caused by pressing it,

all favored this opinion. Hence, M. Dupuytren made an incision over the tubercle, seized it with forceps, and removed it. The patient returned four days afterward: the wound had cicatrized; and he was astonished and pleased that the extirpation of this little body had relieved him from so much suffering.

Case 8. Two years ago, Drs. Marx and Alibert were called to see a patient who for ten years had felt severe pains in the left thigh, knee, and leg. She had taken all the remedies prescribed for rheumatic and nervous affections, &c. &c. Availing himself of M. Dupuytren's experience, and recalling the numerous instances of the latter's practice, M. Marx carefully examined the limb of this patient, and found under the skin of the inside of the left knee, a small tumor, the size of a pea: this tumor was movable, and when pressed upon, the pains were so severe that the patient lost her consciousness. A small incision was made under the skin, and a tumor, as large as a pea was removed. This small incision was brought together, and the patient's pains were completely relieved. The attending surgeons brought the tumor to M. Dupuytren, who carefully examined it. It was composed externally of a fibro-cellular coat, and internally of a fibrous body, with concentric layers, and similar to the fibrous substance between the vertebrae.

Case 9. Madame P. was afflicted for three years with severe pains in the right leg: these pains returned three or four times a day, and every time their violence caused fainting. Several physicians were consulted, but all their remedies were unsuccessful. The lady consulted M. Dupuytren: he found at the middle and anterior part of the leg, on the crest of the tibia, a small fibrous tumor, the size of a cherry stone. An incision was made, and it was pressed out. It was of a fibrous character, and covered with a cellulo-fibrous cyst. From this time the pains ceased: erysipelas appeared around the small wound, which was removed by some gentle laxatives.

The patient was entirely cured in ten days. Since the operation, she has experienced no pain in the part.

ARTICLE XIX.

ON STRANGULATION AT THE NECK OF THE HERNIARY SAC.

For a long time, it was thought that all cases of strangulation, in inguinal hernia arose from the stricture of the intestine by the inguinal ring. This erroneous opinion has more than once been followed with fatal consequences. In fact, proceeding upon this false principle, surgeons have opened the ring very broadly, and pushed the parts back into the abdomen; the symptoms, however, have continued, and increased, and the patients have died, while the surgeon was unable to account for the disease.

These fatal results, which I have often witnessed after operations for hernia, said M. Dupuytren, attracted my attention to the subject, and became the object of my researches. I was soon led to think that the inguinal ring was not the only seat of the strangulation, and my dissections in fact proved, that in most cases the neck of the herniary sac was the cause of the disease. Time has confirmed my ideas on this point, and I now believe that in nine cases of strangulation, eight are caused by the strangulation of the neck of the sac. I know not if this even be the true proportion. Observe, however, that these remarks apply particularly to inguinal hernias. For this arrangement exists more rarely in crural and umbilical hernias. The structure of the parts accounts for this difference.

In order that we may be clearly understood, we will state

what we understand by strangulation. The most correct definition of strangulation is, the action, within us, of a common or foreign body, which presses with more or less force upon bodies placed within the sphere of its activity. The consequences of this pressure naturally deduced; the action of the parts is augmented, the functions of life are altered, or rather they are diseased, and gangrene supervenes. Strangulation may occur in every point; but it is most common in those places where openings exist, through which the parts may be engaged: such are particularly the inguinal ring and the crural arch.

Some of the strangulations are situated externally, others internally. I have observed fifteen species of the latter, continued M. Dupuytren, but more are situated externally. We know that science is useless except for external strangulations, and that it is almost useless in internal. But between these two kinds are some which may be termed mixed, as those which are caused by the reduction of the hernia in a mass. Many years since, a female cadaver was brought into our amphitheatre: externally, it presented nothing remarkable; but on opening the abdomen, we saw behind the crural arch, a tumor formed by the intestine; it was quite large, of a livid red color, and a portion of the epiploon was interested in the herniary sac. On examining this tumor, we perceived that a fold of the intestine was gangrenous. Strangulation had taken place at the neck of the sac. I learned, added the professor, that this female had symptoms of strangulation two days before: attempts were made to reduce it; the hernia re-entered; it was considered reduced, when the symptoms suddenly reappeared: all assistance was useless, and the patient died soon after.

In other cases, I have found internal strangulations, the cause of which was primitively in the abdomen. In one individual affected with hernia, there were unequivocal signs of strangulation: I performed the operation, but the herniary sac contained only a portion of the epiploon; I drew out the in-

testine, and then perceived that the strangulation was on the inside of the pubis : I cut it, and the patient recovered.

But how does strangulation at the neck of the sac occur, and what are the anatomical structures which favor it ? When the intestine comes forward, it pushes before it the peritoneum, which forms in the inguinal canal a kind of tunnel, the point of which is turned downward, and the wide part upward ; but in order for the tumor to progress, the state of things must change, and the wide part only look downward. This change is owing to the situation of the ring. Its opening is very narrow, being at most but four or five lines in diameter. As the hernia enlarges, the neck of the sac is wrinkled by the weight of the hernia, by the tendency of the displaced perineum to contract ; a tendency which is proved by the obliteration of the vaginal tunic in children, the form of the epiplocele, which is thin towards the ring, and large at the base of the sac. But the principal cause of this circular groove, of this contraction of the neck, arises from the application of a truss on the hernia : the compression of this on the neck of the sac, wrinkles, contracts, and inflames it, and also the cremaster muscle and cellular tissue ; hence a contraction and a structure which if not fibrous, is at least very resisting. The neck also may become cartilaginous.

The diameter of the sac, and its anatomical structure, also favor the strangulation. In fact, in most cases, its opening is three or four lines in diameter : its thin cutting edges, formed by the peritoneum, render the strangulation more dangerous than that of the ring, which acts upon the intestine less forcibly : but there is another anatomical fact, which renders strangulation by the sac more easy : it is the state of individuals in whom the testicle passes into the scrotum very late, and gives rise to the formation of a scrotal hernia ; for the term congenital belongs only to hernias existing at birth. Examine a scrotal hernia, and you will always find this arrangement : the orifice through which the parts emerge is very

narrow, and has extremely sharp edges : below, you perceive the neck, the inguinal ring of its usual dimensions, and the kind of cup in which the herniary portion of the intestine is contained. If you then draw the intestine in the sac, you see the strangulation form of itself, and you understand what occurs during life.

We have shown that in most cases strangulation occurs at the neck of the sac : we will now inquire whether this neck be fixed or movable. Observation proves it is always movable, because its component elements are united to the adjacent parts by a very loose cellular tissue. The slight adhesions of these parts, their slight union with the aponeurotic openings, explain why the hernia enters and emerges so easily.

Are there symptoms to show the existence of strangulation produced by the neck of the herniary sac? Certainly ; and there are symptoms even of the different kinds. This strangulation occurs most frequently in congenital hernias. Let us now inquire, upon what circumstances the diagnosis depends. Whenever the strangulation exists at the neck, we may push back in a mass, and without any difficulty, the whole, a half, a third, or even a quarter of the herniary mass, and then cause it to reappear : but in order to do this, the hernia should be cylindrical, the inguinal canal should be broad, and the peritoneum undetached. In more than forty cases we have seen the hernia pushed backward in a mass, and the symptoms continued. If the tumor were at the ring, in the canal or at the upper orifice, this motion could not be performed, because these parts are almost inflexible, while the neck, on the contrary, is very movable, as we have stated before, on account of the looseness of the parts. I must add, before going farther, that you must be particularly on your guard against this apparent reduction, which has deceived many practitioners, because then the symptoms of strangulation then continue. When a case of this kind is presented, we must try to make the tumor reappear : if we cannot, we must

divide the ring and draw the intestine downward. I have been obliged to do this more than ten times in this hospital, and have always been successful. In these cases, the tumor preserves its tension, and we can always, by examination, find a painful part, which corresponds very nearly to the seat of the hernia. Thus, for instance, after the operation, we can indicate the place where the reduced intestine exists, by the greater sensibility which exists in this place. Hence the tumor and the painful part indicate that in this place is a hernia reduced in a mass.

When the strangulation occurs at the ring, that is, at the lower orifice of the inguinal canal, the tumor formed by the hernia does not extend above this part: the whole course of the inguinal canal is empty, indolent, and insensible to the touch, and the ring appears compact, hard, and tense. On the contrary, when the strangulation is situated at the neck of the herniary sac, that is, as high as the upper orifice of the inguinal canal, this canal is constantly full, hard, and painful, and feels like a cylindrical tumor, the direction of which is from below upward, and from within outward. Sometimes we can even pass the finger between the displaced parts and the ring, which therefore cannot cause the stricture.

In some subjects, continued M. Dupuytren, the strangulation exists the whole length of the canal, and then its upper surface must be slit from one end to the other. Sometimes two strangulations exist instead of one; at the same time, there is a slight contraction at the ring, and a greater contraction at the neck of the sac.

When the sac is very movable, and may perhaps be partly pushed into the belly, the strangulation often extends more or less above the inguinal canal. It may also exist far from the ring, when the hernia has been reduced in a mass. We are then led by a natural transition, added M. Dupuytren, to say a few words of the strangulations which take place in the abdominal cavity. Here the danger is greater. The reason

of it is evident : the situation of external strangulations is known, and the accident takes place in a determinate manner. There can be no error in the diagnosis. Internal strangulations, on the contrary, have no fixed situation. Their formation does not depend on constant organic arrangements, but on accidental and very variable circumstances. There is, however, one species of internal strangulation which we term mixed : it is the most common, and is easily recognized : it is that caused by the reduction, within the belly, of hernias strangulated at the orifice of the neck of the sac which contains them.

It may perhaps be objected, that these distinctions are useless : our answer is ready. We suppose that a strangulation at the neck of the herniary sac existed in a patient, and that the inguinal ring was divided ; the same thing will happen as occurred at an operation at which I assisted : the ring being divided, the parts immediately re-entered. I must say, added M. Dupuytren, that I had some doubts as to the success of the operation. The symptoms of strangulation having continued, it was thought that peritonitis existed. The individual died ; the cadaver was opened ; the cause of the disease was in the neck of the sac. The ring had been divided, but the parts were still strangulated. We see by this how important it is to know exactly the seat of the strangulation. In order to this, the intestine must be drawn towards the operator, and he must pass his finger along the herniary portion, to discover the nature of the obstacle.

Does the strangulation which occurs at the upper orifice of the inguinal canal differ from that situated at the lower part of this canal ? Yes : because, in the first case, the parts are much more disposed to gangrene, since the edges of the upper orifice are so thin, that they press very much on the neck of the herniary sac, while the inguinal ring having blunt edges and a broader opening, the strangulation takes place more slowly, and the intestine is pressed less forcibly. A common

ring will demonstrate this difference very well: in fact, a broad ring will exercise no compression; but if it has sharp edges, it will cut the organs rapidly.

As the strangulation at the neck of the herniary sac destroys the parts very promptly, we must operate immediately, because it is difficult for the hernia to re-enter perfectly; and farther, because the cutting edges, which press on the intestine, are a constant cause of gangrene. The resistance of the tissues here demands our attention: the peritoneum sustains pressure a long time, but the mucous membrane is soon cut. If the strangulation continue two or three days, the cellular membrane is divided in its turn. Finally, in some cases, the peritoneum itself is cut, so that the least force is sufficient to separate the two ends of the intestine, and gangrene finally appears. We then see, that when we operate in these hernias, the intestine must not be drawn out, until it is separated very extensively; for only a portion of the intestine might be drawn out, which would cause an effusion into the abdomen.

Let us now mention some cases in support of the precepts which we have laid down.

Case 1. *Inguinal hernia strangulated at the neck of the sac. Operation. Peritonitis. Death.* A man, forty years old, of a good constitution, came to Hotel Dieu, the 11th of January, 1831, with a strangulated hernia. For four or five years a tumor had existed in the right groin. This man accounted for it in the following manner: he was carrying a sack of wheat, which was divided into two parts; the anterior, which was the heaviest, having been drawn forward, he made a violent motion backward, to replace it; he immediately felt in the left side of the chest a severe pain, which was caused by the distention of the muscles. This pain was relieved; but sometime after, a small tumor was perceived in the right groin: it disappeared when the patient laid down, but reappeared when he stood up. A second tumor came on the other

side, which presented the same characters. These were two inguinal hernias, the first of which was larger than the second. He then used a double inguinal truss : he thus guarded against bad accidents. Yesterday, he removed his truss to urinate ; probably he made some effort in order to this : the hernia of the right side had enlarged ; it was hard and irreducible. From this time, the patient felt colics ; nausea and vomiting supervened : an obstinate constipation existed. Attempts at reduction were unsuccessful, and M. Dupuytren stated that strangulation existed at the neck of the sac. The patient was put in a bath, and the taxis was ineffectual. What remained to be done ? Must we wait till the hernia was reduced spontaneously ? Although this sometimes takes place, gangrene, peritonitis, and death, have often followed an operation deferred too long. We have always been more successful in operating on patients during the first twelve hours after strangulation had occurred, than after that time. Farther, strangulation at the neck of the herniary sac is a powerful reason for performing the operation ; for in ten cases of this kind, hardly one can be reduced. A soft tumor is doubtless most easily reduced ; but in this case, the hernia was hard and tense. The operation being indicated, M. Dupuytren proceeded as follows : The skin over the upper part of the tumor was raised in a transverse fold, which was held on one side between the thumb and the index finger of his left hand, and on the other by an aid who stood opposite to him ; this fold was then divided by a bistoury. The incision was then extended towards the upper part of the tumor, in order that the ring might be exposed and carried downward, in order to avoid the formation of a pouch. The layers of the subcutaneous cellular tissue were divided : a small artery was tied. On coming to the herniary tumor, M. Dupuytren stated that it contained a great quantity of fluid, a fortunate circumstance for the operation. In fact, the sac was no sooner open, than abundance of serum was discharged ; the strangulated portion of the in-

testine was of a violet red : some points, which were more strongly injected, seemed to indicate too violent efforts at reduction : a portion of the intestine was drawn outward, and it was seen that this red color extended into the abdomen. The finger was introduced into the wound, and confirmed the justice of the diagnosis. The herniary sac was drawn downward, and its neck having been cut upward and parallel to the median line, the strangulated portion immediately passed into the abdomen. The usual dressings were applied. Enemata were administered directly after the operation, and produced copious discharges. The following days the belly was painful. An infusion of chamomile was given to the patient : a great deal of wind passed off, and he was relieved. The fourth day after the operation, his general state was satisfactory. The dressings of the wound were removed, and it had a good aspect ; the cellular tissue below the peritoneum, however, was slightly tumefied : (diluent drinks.) The fifth day, the patient suddenly became delirious, although no fever nor heat existed. A soothing potion was given him. M. Dupuytren recognized nervous delirium, and prescribed an enema, with twelve drops of laudanum. The cerebral symptoms were removed, and the seventh day they had not reappeared. The patient's progress was satisfactory, until the nineteenth day after the operation, when on examining the wound, which otherwise appeared to be healing, and on carrying the hand above the iliac fossa, we found a hard, glistening tumor, in the centre of which was a fluctuating point. What was its nature ? Was it a stercoral abscess ? But the hernia had been strangulated only for twelve hours when it was reduced. We had reason to think an inflammation was developed in the cellular tissue, around the neck of the sac, which had extended to the abdominal parietes. If left to itself, the tumor might cause an effusion internally. If situated in the belly, and if it should open before adhesions were formed between the parietes of the abscess and the abdomen, an effusion might ensue which would be fatal. In

upwards of twenty cases, M. Dupuytren has known these abscesses to discharge through the inguinal canal. He has sometimes favored this discharge of pus, by introducing to the abscess, and through this canal, a female catheter. With these views, he did this two days afterwards; but he could neither pass the catheter nor a probe to the part; he then resolved to wait, in order to study the progress of nature, and second it. The abscess gradually pointed at the skin. Certain then that the adhesions would prevent an effusion, M. Dupuytren opened it, the thirty-ninth day after the operation. At first, a little healthy pus escaped; but on enlarging the opening, pus was discharged in abundance, and the patient was immediately relieved, but the engorgement did not entirely disappear. A very small wick, spread with cerate, was introduced into the wound. The next day, the discharge was slight; the day after, it had diminished, and the patient seemed doing well. Two days afterward, the patient was suddenly attacked in the evening, with pains in the belly, nausea, colic, and vomiting: (leeches to the abdomen.) On the next day, these symptoms were slightly abated, but the patient's countenance was bad. The next day he died.

Autopsy. A cicatrix, two inches long, was seen in the right inguinal region, and a small incision above. The head and the chest presented nothing peculiar. The peritoneum was evidently inflamed. There was a small quantity of pus between the circumvolutions of the intestine, which adhered slightly to one another. We observed a fistulous orifice near the abdominal opening of the inguinal canal, situated between the peritoneum, and an abscess in the abdominal parietes. Another perforation corresponded to the external opening of the integuments, but it was closed by very intimate adhesions of the cæcum. The abscess seemed to have been formed in the inguinal canal, and afterwards to have proceeded to the abdominal parietes: it was bounded internally by the adhesions of the intestines to the abdominal parietes; on the outside, by

the cicatrix. These adhesions seemed to have been broken, and to have produced the effusion which had taken place through the first fistulous opening, mentioned above.

This case gave rise to several important remarks. Individuals affected with hernia immediately apply a truss; but they think it can be left off either to obey the calls of nature, or when they sleep. In the former case, the effort of straining sometimes reproduces the hernia, which may then be strangulated; in the second case, the same accident may occur in getting into bed, or in performing certain motions. Hence, persons affected with hernia should always wear their trusses night and day.

In this patient, an inguinal hernia existed. A considerable fold of the intestine appeared to be strangulated; but the lower orifice of the inguinal canal did not compress the intestine in the least, which could be moved and passed easily to the upper part of the canal: the strangulation then existed at the cutting edge formed by the peritoneum, at the place where the sac commenced: the operation proved the truth of this diagnosis. There was every reason to think the case would terminate favorably; when one of those abscesses, which frequently form in the cellular tissue, surrounding the neck of the sac, caused a complication of the disease, and peritonitis, which was fatal.

The following case is termed by M. Dupuytren a vaginal hernia.

Case 2. *A vaginal inguinal hernia, strangulated at the neck of the sac.* Abel Fournier, twenty-three years old, thin and lymphatic, has had from infancy an inguinal hernia on the right side, which was disregarded: a slight effort caused its strangulation: hickup, nausea, vomitings, and colics, supervened: the patient attempted to reduce the hernia, but unsuccessfully. Forty-eight hours after the symptoms appeared, he came to Hotel Dieu: his state was as follows.

The herniary tumor was the size of an hen's egg: it could

be partially reduced : but as soon as it was left to itself, and the pressure was removed, it resumed its usual size. An oblong and very hard body existed along the inguinal canal. The belly was tense and tender upon pressure ; the patient constantly vomited bile ; he experienced severe colics, and obstinate costiveness existed ; the pulse was corded, and very frequent. He was carried to the bath immediately, where the taxis was attempted, but in vain. An operation was the only remedy. It was proposed to the patient, who refused it. He was bled several times, and kept in the bath for many hours. During the day, a great number of leeches were applied to the anus and abdomen. The second day, the symptoms increased. The patient vomited feces ; the pulse was quick and small ; the abdomen more tender ; thirst urgent. The patient was advised to drink little, in order to check the vomiting, and merely to wet his lips with an orange. The third day, the abdomen was still more painful ; the prostration was extreme ; there was a general paleness : he again refused to submit to an operation. The fourth day, the pulse was almost imperceptible ; there was great weakness ; a deceitful calm supervened, with a slight remission of symptoms : on touching the hernia, a kind of crepitation was felt, which indicated that the parts were gangrenous. The fifth day, the hickup, which had almost ceased, returned ; the extremities were cold. The sixth day, the hickup was constant ; the pulse was imperceptible ; the whole body was cold. The next day, the patient asked to have the operation performed ; but the visit was no sooner ended, than he died.

Autopsy, twenty-four hours after death. The belly was a little less tense than during life ; there was no stiffness of the cadaver. M. Dupuytren performed the operation for hernia, as if upon a living subject : the soft parts were successively divided as far as the sac, which was opened at its upper and anterior part. A brownish serum, which had a gangrenous smell, escaped : a fold of small intestine, from three and a half

to four inches long, of a gray color, was soft, and collapsed like a sheet of wet paper. Above the intestine, we saw the anterior extremity of the testicle: the finger could be passed easily into the ring, and thus be carried to the upper part of the inguinal canal, where the strangulation existed, formed by a circular falciform neck, adhering anteriorly and posteriorly to the intestine for about a line. Above the strangulation, was a small perforation of the intestinal canal, at the upper end of which was a gangrenous portion, three inches long. Next to the gangrene, the intestine was a violet red, which continued to the stomach. The lower end, which was about six inches long to the cæcum, was contracted, as was also the whole large intestine, which was nearly the size of that in a child six years old. In the upper end was a quantity of liquid fecal matter, which would have passed into the belly through the small opening in the intestine, had not an adhesion been formed in this place. When the strangulated part was divided, we saw a very distinct circular depression of the intestine, which, when examined internally, seemed in this place to be destitute of its two inner membranes. The intestines adhered in every part by recent false membranes. The small pelvis contained a great quantity of pus. On opening the abdomen, a great deal of purulent serum escaped, and a fetid gas, which was inflamed by a candle, and continued to burn for several minutes. The lungs were slightly engorged posteriorly; the other organs were healthy. We stated, that on opening the abdomen, a quantity of inflammable gas escaped. This circumstance confirmed an important fact, viz. that the inflammation of the membranes causes a marked change, not only in the quantity, but also in the nature of their secretion. The gas, which continued to burn for several minutes, was probably carburetted hydrogen.

We have shown, said M. Dupuytren, that internal strangulations, which are caused by reducing in a mass hernias strangulated at the neck of the sac, may generally be distin-

guished by symptoms, showing that hernia formerly existed, as also by those actually present. In some cases, however, it is not easy to recognize them, especially if we have not witnessed the reduction of the hernia. The doubt is still greater, if the patient be affected with two hernias which were reduced simultaneously, and which present no sign of strangulation upon one side more than upon the other.

Case 3. *Double inguinal hernia. Strangulation at the neck. Operation. Dressing. Cure.* J. Geoffroy, a locksmith, forty years old, had two inguinal hernias; the left had existed twelve years, the right but three: for the first, he had worn a truss seven or eight years; the second was left to itself. One day, while passing over the *place du Carrousel*, he heard his truss crack: he felt of the left hernia, which pained him severely, and had enlarged. On returning home, he attempted to reduce it, but in vain, and experienced all the symptoms of strangulation. The next day, he took, of his own accord, two grains of tartar emetic, and sent for a surgeon, who succeeded in reducing the hernia: but the symptoms continued, and the fifth day after the strangulation, the patient was brought to Hotel Dieu. The next day, M. Dupuytren examined him very carefully: the belly was painful: there was hiccup, vomiting of fecal matter, and constipation. Symptoms of strangulation existed, but peritonitis might be present: farther, the diagnosis was difficult, on account of the two hernias which had been reduced, and presented no tumor behind the inguinal ring. There were no other symptoms of the anterior existence of these hernias than the dilatation of the rings, and the contradictory assertions of the patient. M. Dupuytren was unwilling to operate before he was satisfied that there was no other chance for the patient; but the next day, the seventh since the strangulation, as the patient seemed doomed to certain death, an operation was determined upon.

Having remarked a tumor in the right inguinal region, and

that the pain was more violent there, this was the side selected. The skin was divided according to the axis of the hernia : under it was a small tumor, which might be mistaken for the spermatic cord, and then for the herniary sac, after coming to a smooth cavity, from whence a great quantity of serum was discharged. This was a serous cyst, behind which the true sac was situated. This latter was a little larger, and contained neither intestine nor epiploon, but only a little serum, in which specks of albumen floated. On introducing the finger into the abdomen, we could feel adhesions of the intestines either with each other, or with the abdominal parietes, which are certain signs of peritonitis. M. Dupuytren immediately operated on the other side : he carefully divided the cellular layers which covered the tumor : he opened a pouch, in which was a fatty mass, which appeared to be the epiploon : M. Dupuytren considered it so for an instant : but seeing a fibrous layer below it, and requesting the patient to cough, this layer was raised : he divided it and some others very carefully : some bloody serum immediately escaped. M. Dupuytren was now satisfied that strangulation existed on this side : this liquid, when compared with that on the other side, was an evident proof of it. In the sac, was found a small, reddish, fatty mass, which was considered as the tumefied epiploon. When the finger was introduced into the ring, a circular stricture might be felt at a considerable height. This sac was drawn outward ; and with it, a small portion of the intestine, which was red and shining ; while an aid held it firmly, and kept the two cut edges of this sac in place, a probe-pointed bistoury was introduced upon the finger, and the strictured part was slit upward and outward : the pain of this incision caused expiratory efforts, and a greater portion of the intestine protruded : the stricture was divided in several directions ; and, to avoid reducing the hernia in a mass, this stricture, formed by the neck of the sac, was held firmly, while the intestine was returned. The patient's wound was dressed, and he was carried to his bed : he had a good day.

An enema was administered, and fomentations were applied upon the abdomen, which was painful : the face was red, the pulse quickened, the tongue covered with a brownish coat : (bleeding.) The next day, vomiting ensued, but the colics were frequent, the pulse was quickened, the face reddened : he was bled several times on this and the following day. Finally, the pains in the belly were entirely relieved ; the patient was perfectly cured. He left the hospital at the end of September.

Case 4. *Double inguinal hernia. Strangulation at the neck. Operation. Cure.* The 27th of September, a man was brought to Hotel Dieu, in the most critical state : his extremities were cold ; the face discolored ; the pulse extremely small, and hardly perceptible ; the belly tense and painful, especially at its lower part : he had hickup, vomiting of matters which had no smell, and constipation : it was believed that he could live only a few hours : he could just answer, that he had for a long time two inguinal hernias ; that these hernias had become painful. He was put in a bath, while waiting for M. Dupuytren, who found him in the same state. The patient's statements were extremely important, but unfortunately they were contradictory. We then had to depend on sensible signs, and these signs could not indicate positively the cause of the disease. Was it a peritonitis, or an internal strangulation ? M. Dupuytren ordered enemata and venesection, and in the evening there was a copious evacuation, and again through the night : the vomiting ceased : the hickup was constant. The next day, the pulse was more full : the face red : the belly soft : the patient took more notice, and gave a history of his disease. He had, for eleven years, been affected with two hernias, one of which appeared six months after the other. These hernias, to which he applied a truss with two pads, sometimes came down below this truss, but they were easily reducible : the right came down more easily than the left. These hernias had never caused any inconvenience until the night before he entered, when he exerted himself : the two

hernias came down, and became painful: he himself reduced the right hernia, and called a physician, who reduced the left and prescribed for him some chamomile. The symptoms of strangulation increased, and he was brought to Hotel Dieu. What course was to be pursued? Most of the symptoms of strangulation existed; but there was no vomiting of fecal matter, and the alvine evacuations were free. The patient was desired to walk: the left hernia came down; but it was soft, and re-entered with facility. There was no sufficient reason for operating: the evening, the same state existed: the patient had several evacuations: there was no vomiting, nor hickup: the belly was soft and tender on pressure, especially in the hypogastric and iliac regions. M. Dupuytren, satisfied of the advantages of the operation, if strangulation existed, determined to perform it: he operated on the right side, because the hernia did not reappear on this side, while when the patient was well, it came down more easily on this than on the other side. An incision, from two and a half to three inches, was made in the skin, in the direction of the ring: a kind of cylindrical cord then appeared, which had been felt through the integuments. It was carefully opened, and we came into a smooth pouch, which was recognized as the herniary sac: the finger, when introduced into this pouch, felt a cul-de-sac: a director, when passed in the same direction, penetrated into the abdominal cavity, and a bloody serum was discharged. The opening in this sac was then enlarged: it was drawn outward, and we saw that its neck was contracted as if by a kind of cicatrix. This neck was divided: the finger was passed into the abdominal cavity, and no other strangulation existed. The patient recovered without any relapse.

These two cases are highly important, and demand your special attention: they give us occasion to enlarge upon the general ideas we have previously stated. In fact, we can imagine the embarrassment of the practitioner when called upon to prescribe for patients affected with strangulated her-

nia which has been reduced in a mass. The first difficulty is to determine, whether strangulation exists or not, when no hernia is present : and when its existence is proved, the second difficulty is to reach the strangulation, which, by re-entering into the belly, is removed from the sight and from surgical instruments. But are there signs to denote whether the strangulation continues within the belly or not, after the hernia is reduced ? Certainly, the existing and pre-existing circumstances will always show the nature of the injury. The first are, the breadth of the ring ; the mobility of the hernia, which is the consequence of it ; the reduction in a mass, which is the result of it ; and the continuance of the symptoms without any remission. But perhaps these symptoms may not have been observed with care : we must then depend upon other signs, several of which have been mentioned, but on which we must again insist, on account of the difficulty of the diagnosis : these signs are, a fixed and circumscribed pain in the hypogastric region, perceptible behind the opening through which the tumor appeared and disappeared, and an evident tumor in this region.

Let us dwell a little on this latter symptom, which presents several interesting particulars. When the tumor which forms the hernia is reduced in a mass, it cannot proceed far into the abdomen, because it is formed, at least in part, by the peritoneum, which, although movable, always remains in the region to which it belongs, and consequently retains the tumor in that place. The hernia then is always situated behind, and on the inside of the opening through which it has been reduced. Surrounded by the cellular tissue, which previously united the peritoneum to the abdominal parietes, and which is displaced to receive it, it is also covered by a second layer of the peritoneum, that which it has detached from the posterior face of the abdomen ; so that to penetrate into the herniary sac by dividing the parietes of the abdomen, we must divide the peritoneum twice, penetrate into its cavity before coming to that

of the sac, at least unless we proceed as if for the ligature of the external iliac artery, by raising the serous membrane.

This method might be employed ; but the process I use is more simple and less dangerous : it consists in bringing out the hernia through the inguinal ring, certain of finding it on the inner face of this opening, and of seizing it with forceps and bringing it outward, with or without cutting the edges of the ring. If we examine the tumor through the cavity of the peritoneum, we see that it is situated in the iliac fossa, a little more on the outside in crural hernia, and farther inward and more deeply in inguinal hernia. It presents a narrow and close opening, through which the two ends of the intestine pass, and form a fold in the cavity of the sac. In this part, the intestine is compressed, contracted, thin, strangulated, and gangrenous, the upper part more frequently than the lower : the former is so much dilated as almost to tear ; the latter is thin and empty, and resembles the intestine of a child.

The anatomical relations of the tumor being known, we come to the other symptoms. The pain and the tumor are not the only ones which show the continuance of the strangulation in the belly : in pressing down the abdominal parietes, we feel a greater or less resistance, which is sometimes perceived at the ring, either by introducing the finger into this opening, or by making the patient cough : the effort made by the tumor to emerge, in dilating the canal, and sometimes on raising the skin which covers it, must also be considered. But that which is most characteristic, is the continuance and nature of the vomitings. Slight vomiting is not sufficient to establish the existence of an internal strangulation ; but the vomiting should be excessive, and present a peculiar character. Mucous or bilious matter would indicate an irritation, a gastritis, or an enteritis, as well as a strangulation ; but vomitings of a yellow liquid, having the odor of feces, will remove all doubts : when this symptom co-exists with the preceding, we must admit that

the hernia has been reduced in a mass, and strangulated on the inside as it was on the outside.

Before proceeding to the rules of treatment, said M. Dupuytren, we must make one remark; relative to the strangulation at the neck of the herniary sac. If this cause of strangulation exist more particularly in the inguinal hernia, we have also observed it in crural hernias: we might cite several instances of it; but as they are very similar to the cases mentioned, we shall merely call your attention to the subject.

We will now lay down the general rules for the treatment of these affections, which are so common, and ordinarily so severe. The treatment must differ very much, according to the part strangulated. If this strangulation occurs at the lower orifice, a simple incision will be sufficient to remove the symptoms. But this will not be the case, if they are caused by the neck of the sac; for if the ring merely were divided, the hernia would re-enter, but the obstacle would not be removed, and in a few hours the patients would perish. We must, then, pass the finger through the sac, until we come to its upper part. But this introduction is not always so easy: in this case, we must divide the stricture, and then the finger is easily introduced, and comes to the upper part, which forms a kind of arch: it has no orifice, and we perceive the strangulation. In this case, we must operate upon parts which are out of sight. In order to this, the surgeon takes a narrow, concave, or convex, probe-pointed bistoury, and glides it flat along his finger. On arriving at the opening, he divides the stricture forward and upward, as for a simple incision. Some persons use a director; but we have often seen bad accidents resulting from the employment of this, because the instrument frequently leaves the groove, and wounds the intestine, causing peritonitis, and, on examination after death, we find a small opening in the healthy parts. These accidents cannot happen, if the finger be used as a guide to the instrument. The form of the bistoury seems to me to have a marked influence on the cele-

urity of the operation : the probe-pointed bistoury, however, is certainly the safest. Where shall we find the strangulation? Sometimes it exists at the upper orifice of the inguinal canal, sometimes lower down : we have also seen it higher up. Farther, in order to render the operation certain, we must try, with the utmost care, to draw down a portion of the intestine, in order to be satisfied that no more obstacles exist. Sometimes, added M. Dupuytren, we have found a strangulation as high up as the finger, and have been unable to bring it down ; but in this case, it can be divided by a narrow probe-pointed bistoury, guarded in every part except for two or three lines.

When the hernia has re-entered, every means possible must be used to bring it down again. The patient should walk, and cough : in a word, he must facilitate as much as possible the reappearance of the hernia.









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